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GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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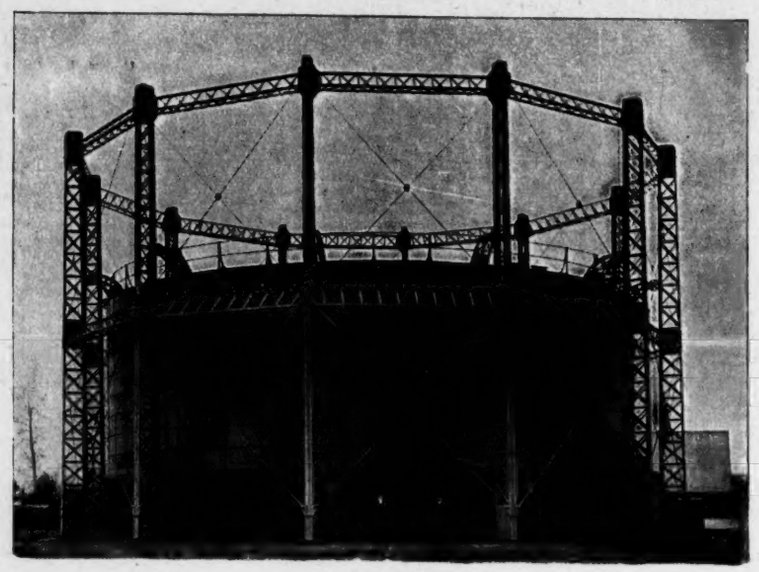

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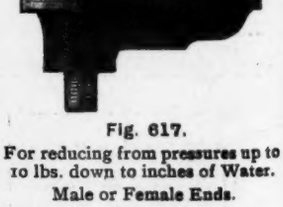

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXXXVIII., No. 2821.] TUESDAY, JUNE 5, 1917. [69TH YEAR.

EDITORIAL NOTES.

National Gas Council Report—Appointment of an Important Committee.

THE National Gas Council met yesterday afternoon, and received a report by the Executive Committee. In this document (which was signed by the Chairman, Mr. D. Milne Watson), we have presented merely the superficies of the work the Council have been doing, or have in hand directly or through Committees; and the members of the General Council and other readers are left to make their own measurements of what unlies it. Such an extensive area of subject-matter is not dealt with without cutting into time and having expended upon it much individual and collective consideration. Policy dictates reticence in regard to the publication of information on some questions; so that all that meets the eye does not by any means comprise the *summa summarum*. We are sorry to see, in regard to protected occupations in gas-works, that the situation is still "rather obscure and difficult," and that no one seems able to definitely unravel the unholy tangle into which this matter has fallen. Among others, local tribunals and military representatives appear to be altogether at sea, and are wanting to have the position clearly explained to them. One thing is now plain, that it is necessary to apply for certification in order to come under the schedule; but numbers of undertakings which are not certified or eligible for certification are being dealt with and protected by the Munitions Area Recruiting Officers. However, the Executive Committee are keeping a close surveillance over the position, and, as has been understood for some time, "the "need for reasonable protection for the gas industry is "thoroughly recognized by the Ministry of Munitions and "the Local Government Board."

There will be disappointment in some quarters of the industry in regard to the statements in the report concerning such matters as the prices of benzol and toluol, and relief of the section of the industry working under the sliding-scale of price and dividend. On the other hand, satisfaction will be felt that the Council are close upon the heels of contemporay work which may directly or indirectly affect, either now or after the war, the interests of the gas industry. Great care has to be exercised over what is being done in certain directions; development in competing quarters has to be countered by development, if progress is to be effected in certain lines of business instead of a march backwards being made; and considerable responsibility, too, rests with those who enter into alliances. The trading interests of the industry in relation to motor spirit and the materials for dye production when there is no longer pressure for crude benzol and toluol by the Ministry of Munitions are of current moment if there is to be prospective success. These are all matters that have been discussed in these columns from time to time; and the developments that are effected through the National Gas Council will be closely watched by the whole industry. Conspicuous among the announcements in the report is the one referring to the appointment of a Committee to consider questions relating to the work of the Board of Fuel Research, the Coal Conservation Committee, and the Board of Trade Committee on the provision of a cheap supply of electrical power. This appointment recalls the article published by us on April 17, under the heading of "Wanted, a Special Committee." This Committee composed of Messrs. J. Ferguson Bell, A. E. Broadberry, Charles Carpenter, D.Sc., Dugald Clerk, D.Sc., T. Goulden, A. A. Johnston, Frank Jones, E. W. L. Nicol, and two members of the Society of British Gas Industries (to be nominated) should be capable of doing some exceedingly valuable work in the protection and furtherance of the interests of the gas industry. They have some far-reaching and potent problems awaiting their consideration.

A "Nebulous" Ownership.

IN private conversation with a man of position in the gas industry last week, he remarked that it was a nebulous sort of ownership that the "JOURNAL" and those who thought similarly were suggesting for the proposed new gas-headquarters, while, on the other hand, the Institution of Gas Engineers was an old-established and well-founded body, and therefore ownership and control of headquarters should be vested in it. We are afraid our friend has not a very clear notion as to the aims of those who talk of headquarters for the industry, and not of headquarters for a section of the industry, nor does he know much about the history of the industry's organization, and the comparatively little it was able to accomplish until materialization commenced of the ideals of combination of elements and unified action. If he knew more of these things, and studied a little more intimately causes and effects in connection with the past of the gas industry, he might be able to see that there is nothing more "nebulous" in the industry entering into a joint proprietorship and use of headquarters than there is in the nation (which is not organized in the same way as the industry) having joint ownership in the Houses of Parliament, the palatial Government offices, and national institutions generally. When examining the Board of Trade returns relating to statutory gas concerns, we see nothing "nebulous" about the gas industry; but we find that its ownership of property is represented by a capital value which entitles us to believe that it could jointly carry a bit more without great trouble or hardship. The industry, too, unless we have been deceived, can claim to be older established and better founded than the Institution of Gas Engineers, which, as a matter of fact, owes its birth and existence to the industry, and not to itself. The industry can also claim to be more durable than the constituent members of the Institution. Not many years ago schism in gas-engineering organization arranged for an Institution and an Institute running along parallel lines. Supposing history repeated itself? What then about the ownership of headquarters? The gas industry also controls the limits of the operations of the Institution in a very effective manner. One of the very first of the arguments for the combination of the whole of the interests of the industry was the inability of the Institution to do any better work, owing to the short length of financial rope allowed it by the industry and the little actual power that it possesses in determining matters of policy. Part of its income now is due not to its own existence, but to that of the British Commercial Gas Association; and this fact is illustrative of a good deal.

The members of the Institution know well enough that our attitude is not one of animosity, and that all through the piece our advocacy for a better combination in the industry, and for headquarters for it, has been to make the industry itself more powerful, and to gain for it greater recognition and through that to make more effective its technical and other operative forces. The aim has been a very definite one. The Institution itself is not going to become stronger and do more efficacious work by simply establishing it, with its present inherent deficiencies, in headquarters of its own. There is work to be done and to be maintained that is preliminary and essential to anything the Institution can do standing alone. It has tried to do good work in the past; its measure of success is bounded by its composition and power. The National Gas Council, the British Commercial Gas Association, the Sulphate of

Ammonia Association, the Gas Companies' Protection Association, the London Coke Sales Committee are the monuments to the insufficiency of the Institution, in independent state, to serve the industry, except within certain territory. The proposed vesting of the ownership of headquarters in the Institution ignores the existence of the other indispensable organizations of the industry, and what is worse it ignores the past inadequacy of the Institution as representing the industry. If there are headquarters, they ought to belong to the industry; and these headquarters should be vested as a trust in the chief representative body of the whole industry, which, at present, is the National Gas Council.

Our friend who spoke of "nebulous ownership" probably cannot see the appositeness of the term to the idea that an official section of the industry should be given the ownership of headquarters, while all other interests are kept outside the door—the very thing that has been so harmful in the past to the interests, the reputation, and the recognition of the industry. That same friend has never heard of such a thing as an industry owning headquarters. It is an idea that is beyond anything that has before passed through his mind in regard to ownership and industrial enterprise. He stands aghast at such an innovation. The fact that he has never before heard of anything similar is no argument that it would not now be a good thing for the industry to have central headquarters. The old order changeth. Many fusty antiquities in the way of notions and practices have been deposed by the broader thought engendered by the war. It is by new inventions and methods (which have never previously been heard of) that progress is effected in the world, and by them men and industries are made more effective. Consolidation of forces is the initial line of current national effort. Every means should be taken in the gas industry to produce consolidation in its ranks. We know of no reason why the gas industry should follow any precedent, but we do see very good reason why it should strike out a headquarters line for itself, which would do much in bonding together interdependent units and forces, which some people (for what ends—personal or industrial?) would prefer to keep in distinct compartments. That is not the way to treat any mechanism the one part of which is absolutely essential to the other.

Pressing Current Topics.

We do not know, through the absence of complete publication, that any great advantage was obtained from the discussion at the meeting last Friday week of the Manchester Institution of Gas Engineers. Labour, coal supplies, and blue water gas—all now momentous—were the topics. The best that can be said of the speeches which have been allowed publicity is that there was interest in them; and they gave Mr. Thomas Glover, the gas engineer adviser to the Coal Controller, an opportunity of showing that it is an imperative necessity that coal transport should be regulated, and that no available means, including the use of blue or lightly carburetted water gas, should be neglected in order to produce economy in the consumption of gas coal. While all fully sympathize with the object of the resolution passed, which requested the National Gas Council to strongly impress upon the responsible Department of the Government the urgent necessity of affording the requisite assistance in respect of labour to gas undertakings, so as to enable them to fulfil their national and local obligations, no such request is actually needed. Indeed, it is rather late in the day; for, ever since the National Gas Council came into existence, certain loyal representatives and self-sacrificing workers on the Council have been persistent in pacing the pathways leading to the chiefs of departments influential in this matter, and have again and again expended time in interviews. But the result is the present position, about which some complain more than others, though admittedly, taking the industry through, it has been bled of its man power down to an irreducible point if considerable harm is not to ensue. The National Gas Council, however, have done their best; than that they can do no more. All that may be possible is to make representations in any special cases of hardship. The suggestion that the Council should, if necessary, supply the departments concerned with information as to the maximum daily demand for gas, the maximum coal-gas and carburetted water-gas plant available, and the maximum [minimum?] number of men that are needed for such output, recalls that the Council have not had much encouragement in this direction; for, when they sent out a circular last November asking for certain particulars regarding recruiting, the manner in which they were able to refer to the matter in their report three months later was anything but satisfactory: "The information received from *such of the "undertakings as replied* has been dealt with in consultation "with the Ministry of Munitions." "Such of the undertak- "ings as replied!" That is not satisfactory. The National Gas Council, working voluntarily for the industry, do not want too many "requests;" but no doubt they are pleased enough to receive any number of suggestions, and would find their work made much lighter if a thoroughly helpful support were rendered—remembering that all work undertaken is for the industry's commonweal.

Concerning coal supplies, no gas engineer must be lulled into a false sense of security by the cheery optimism of Mr. Samuel Glover or anybody else; nor by the better state of things that, in view of the season, temporarily now exists. This is a case in which it is no good having faith and belief, or putting off till to-morrow what we can do to-day, because someone or other "thinks" that coals "will be "provided, and the conveyances will be there." It is not the man who has "faith" or "belief" or "thinks" in this particular, but the man with the statistics as to possible output, and the possible transit power at different seasons of the year, whom the gas engineer must follow. That man is the Coal Controller, who has gone to no end of trouble to collect the facts, and to obtain the best available advice. And the man with the statistics and the knowledge looks seriously upon next winter, and counsels large stocking—large in relation to needs—during the long days of summer. Those who help themselves as far as possible by stocking during the next few months will be the happiest during the succeeding short-day months. The past winter's experiences for not a few gas men are not so far removed in time that they have yet faded from memory. They are still an acute influence.

The appeal of the Coal Controller to gas undertakings with water-gas plants to use a proportion of blue water gas or lightly carburetted water gas in order to economize coal, is no idle fancy or passing whim; and, where gas-works are supplied with a good gas-making coal, there is no substantial reason why, up to a certain percentage according to the quality of coal gas manufacture, this should not be made compulsory. The conditions of Mr. S. Meunier (who opened the recent discussion at the Manchester Institution meeting) compelled him last winter to use his carburetted water-gas plant; and he seems to be regretting all sorts of things in regard to it. This is not the time when anyone can afford to make the old quality carburetted water gas; and the day may come—who can tell?—when even light carburation will not be possible, and perhaps not allowed. But Mr. Meunier's chief trouble appears to be the use of 5516 tons of coke for making 152 million c. ft. of water gas (which is a high coke consumption, even if including steam-raising), and being deprived of the coke from the 12,000 tons or more of coal that he would have had to carbonize (assuming his average make of gas is 12,500 c. ft. per ton) to produce the equivalent in coal gas, together with the loss of tar and ammoniacal liquor. We do not notice any reference to the quality of carburetted water gas made at Stockport during this period. But there does not, *primâ facie*, seem to be any reason why the proportion of water gas should not have been of the blue brand, or very close to it. However, neither now nor after the war, especially in view of the unknown and probably fluctuating conditions in regard to the market values of residuals, is there much use in considering this question of the supply of a blend of coal and blue water gas from the point of view of partial detail. Nothing but a proper balance-sheet, giving a comparison of the net cost per 1000 c.ft. in the holder, is of any value. Whatever happens in connection with residuals, the net cost of coal gas (taken alone) bids fair to be higher for some years to come than it was prior to the war. Mr. Meunier saved in the period referred to the purchasing and handling of, and labour involved by, upwards of 12,000 tons of coal; and he might have sold from the use of the 5516 tons of coke 152 million c.ft. of blue water gas incorporated with the coal gas made. Mr. Thomas Glover at Norwich is adding 25 p.ct. of blue water gas to his coal gas, of which he makes 11,000 c.ft. per ton of coal, he oil washes, and sends into the district a mixed gas of 500 B.Th.U. There are no complaints of naphthalene stoppages; and the water gas is put into the holders at about 7d. per 1000 c.ft., compared with very nearly 1s. 8d. for coal gas to-day. Is there not

good economy there? In our "Correspondence" columns to-day, Mr. J. O. V. Irminger, of Copenhagen (who is well known to many of our readers), tells how, making gas from gas and steam coals, he is now using 50 p.ct. of blue water gas, having started with 20 to 30 p.ct.; and the mixed gas is equal to 4000 calories per cubic metre—say, approximately, 450 B.Th.U. gross. Mr. Irminger only wishes he had—in these difficult times when gas coal to him is a very precious substance—more blue water-gas plant available. Compulsion may be a hard master, but it brings experience; and the experience as it grows tells plainly that the days of richly carburetted gas have closed, and that there will be a perpetuation, in part or in whole, of the war-time practices in connection with the supply of a mixed gas. There may be, in some quarters, a reluctance to depart from the old ways; but to necessity and competition there will eventually be a very general yielding in this direction.

Statutory Interference with Industrial Development.

THE present conditions that affect the country generally, and the gas industry in particular, supply the ground for a piece of reasoning which we may commend to the notice of the Private Bill Authorities, and at the same time ask them—though we do not expect an answer—to try to reconcile their action in one respect with these conditions, and then let the gas industry see how, if they are successful, they have managed to do it. There is an appeal just now on the part of the Coal Controller (Mr. Guy Calthrop) to individuals and industries to economize the consumption of fuel as far as possible, to stock coal during the summer months, and to purchase at the nearest sources of supply. And for what purposes? In order, through the last-named expedient, to economize railway traffic (which means expenditure), and by the former two methods to help mitigate the pressure there is bound to be on the railways next winter. Real economy is good at all times; it is as good when peace reigns as in a period of war. But notwithstanding the natural developments that have during the war taken place in connection with the secondary products of the gas industry, both for national and industrial purposes, notwithstanding, too, the efforts that are being made (with the view to suppress the need as far as possible of post-war trade with Germany) to encourage in this country manufactures the raw materials for which are found in the products of coal carbonization, as well as the assistance that such developments will in the future effect in that healthy economic procedure the reducing of the ratio of imports to exports, the Private Bill Authorities this session are still insisting on inserting the one-third purchasing restriction in respect of residual products, although the whole object of purchase is the one of producing an economy in connection with these commodities. The works of tar distillers and of chemical manufacturers are not so thickly spread about the country as are gas-works. Apart from the large control of purchase prices for crude bye-products which the former have exercised in the past, it is a good economic law that the nearer to the place of production such materials can be worked up, the greater the advantage. The Coal Controller is preaching this doctrine in connection with his advocacy of the purchase and use of the nearest available fuel supplies by industries generally, in order to save not only the rolling stock of the railways but the cost of carriage. By the prohibition beyond a one-third purchasing power—no matter how well circumstanced a gas-works may be for producing economy for neighbouring gas undertakings—the Private Bill Authorities are setting themselves against this same sound economic principle, and against the development of an industry. And yet the coking industry, not being under statutory control, can develop in these directions without let or hindrance.

If there is one thing that parliamentary control should not do, it is to put obstacles in the path of the natural development of industries; and one path of natural development for the gas industry is through its residual products. Nobody perhaps more than those engaged on the work of the Ministry of Munitions has been able to witness the enormous changes which are coming over British industry; and it would be well if the Private Bill Authorities would mark the words used by the Minister of Munitions (Dr. Addison) in a recent speech at Kettering: "New industries are springing into life under our very eyes, and old industries that had gone to sleep are being made wide awake again. We have brought into the industry of this country improved methods, and let me say more scientific methods. If we retain and use the lessons of the war properly, we have set going in this country great and wholesome new industries which will continue in times of peace." Again, much as we detest the infamies of the Germans in the war, the British Private Bill Authorities must concede that Dr. G. Krupp von Bohlen und Halbach has brains which he has put to good use for Germany and for his own great firm. In an address which he recently delivered at Munich, he stated that German industry would, on the declaration of peace, have to remain mobilized in the full sense of the word for a further fight—a competitive struggle for its place in the world—certainly none the easier than in pre-war times. This remark applies equally to British industry, and to the gas industry as a prominent participant in industry. A more pertinent statement was that a State-controlled concern may prove its justification where monopoly is possible, where any limits are set to it by the home boundaries; but in the competitive struggle—the source of progress—at home and abroad, this control is bound to deprive any industrial enterprise of its absolutely necessary elasticity, and of the liberty of motion indispensable at a given moment. Gas supply has its home boundaries, and is therefore a fit subject for parliamentary control, providing the control is not oppressive to the effort to meet the competition of other light, heat, and power agents, and restraining to the effort to render the largest and most economical service within the statutory area of supply. But residual products are different. There are not any territorial limitations in connection with them. They are open to competition from beginning to end, and to competition from the unfettered producers of the coking industry and from the tar distillers and chemical manufacturers uncontrolled in their purchasing and selling powers. Nevertheless, the Private Bill Authorities appear to think that, in the circumstances, justice is done by curtailing the liberty of the gas industry, and that this is in the interests of the nation, of gas consumers, and of economy. Are we right in this surmise? Or perhaps the Private Bill Authorities realize they have made a mistake, but prefer to adhere rather than own up to it. This is a time of great revisions and rectifications. Cannot one other be made?

Let us repeat what Dr. Krupp says: "In the competitive struggle—the source of progress—at home and abroad, control is bound to deprive any industrial enterprise of its absolutely necessary elasticity, and of the liberty of motion indispensable at a given moment." And one other pertinent quotation from the address is: "The inevitable obligation, in the public interest, is to bring the enterprise as such to a flourishing condition, to maintain it at the highest state of efficiency, and to develop it in accordance with the requirements of national economy." Do these principles all underlie the one-third purchasing restriction upon the gas industry's secondary products? If not, then is the restriction sound and just—particularly in the circumstances that the industry's competitors are not surrounded by any similar parliamentary barrier to their development?

Mixed Gases.

At a peculiarly appropriate time it fell to our lot to call attention to the case that was being framed against the industry through the subversive lapsing of some of its undertakings into adulteration by excess of inert gases in their primary commodity. Convicting evidence had been drawn from, and was then still being supplied by, the gas-mains of those concerns; but there is ground for thinking that further analyses show that—in certain cases, at any rate—some good has been accomplished by publicity. This matter, and the prevalent conditions as to coal and oil supplies, also made appropriate the revival of the question of dilution by blue water-gas. On the part of correspondents and our own, we claim nothing more than a resuscitation of these matters, when particularly in the interests of the industry. There are, however, claimants for credit. Something or other was done by them a few years ago, as it was also done by others before them, who do not claim anything. For instance, Prof. Smithells, F.R.S., has not claimed any recognition for what he did in 1905 in telling the gas industry of the maleficent effect of nitrogen upon flame temperature; nor has Dr. Harold G. Colman alluded to the warning he gave the gas industry, through the "JOURNAL" columns in 1906, as to the trouble that would come upon it through the illegitimate inclusion of incombustibles in its primary commodity. Prof. Lewes, unfortunately, is not here now to refer to his work

in connection with blue water-gas; but the "JOURNAL" is here to lay claim to the original publication in this country of the results of certain classical work of Emile St. Claire Deville, of Paris, and for having given the Institution of Gas Engineers permission to publish in their "Transactions" for 1907 the annotated translation which was made for it by Mr. W. J. A. Butterfield, M.A., F.I.C. The subject of this work was: "The Illuminating Power, in Ordinary and Incandescent Burners, of Coal Gas, Water Gas, and Mixtures of the Two Gases." Perhaps there was oversight by the author of a recent reference to St. Claire Deville's work of the following microscopical acknowledgment on p. 415 of the 1907 "Transactions:" "This report has been prepared (by permission) from the columns of 'THE JOURNAL OF GAS LIGHTING.'" It is, however, usual among men to give credit where the original credit is due.

Wanted a Coke Controller.

By whom? By the "Iron and Coal Trades Review." On what grounds? That the price of coke has risen considerably since the war started, and yet no regulation has been applied to it the same as in the case of coal. The argument of our contemporary is beautifully simple and superficial, and proves that it does not know its subject in all its bearings, or, if it does, it prefers to publicly confess an abject ignorance. Coke has an excellent controller always at its side—the local price of coal; and almost invariably it will be found that (unless the gas undertaking is in the hands of a local authority who, for its own reasons, limits the figure without regard to market conditions) the price of coke is a few shillings below that locally charged for coal. This relatively gives good value for money on the thermal efficiency basis, and without contributing to the smoke nuisance. One thing that makes the increase in the price of coke look so much greater during the war period is that owing to the large accumulations before the war there had been a slump in it. This is ignored by our generous contemporary. It also refers to the regulation of the price of coal. Where? At the pit head! It avoids the fact that every ton of coke for sale is produced from approximately two tons of coal at the price of the coal—not at the pit head, but as delivered on the works. Despite the regulation of price at the pit head for coal under contract, many gas undertakings, through short and backward deliveries, have been compelled to fill their requirements by purchasing in the open market at considerably higher prices than the regulated ones—to the extra profit of the sellers of the coal. Our contemporary has no knowledge, too, that the revenue from the coke is brought into account with that from the other residuals to reduce the net cost of gas in the holder; and the net cost of gas in the holder is to-day substantially higher than before the war. The finances of the gas industry are at present suffering considerably from, in some directions, regulation, and in others the want of adequate regulation; and in the case of most of the companies, dividends are regulated according to the price charged for gas and are very thin, while in the case of the maximum price companies some of them are unable to pay their fixed dividends. The coal proprietors have not been suffering from low or regulated dividends. While our contemporary is bubbling over with anxiety for the consumers of coke, Mr. E. W. L. Nicol, the well-known coke expert, is busily assisting the Coal Controller.

Coal Economy and Extravagant Lighting.

The Illuminating Engineering Society on the 15th ult. were discussing the subject of coal economy in relation to lighting; and a comment on the subject appeared in these columns on the following Tuesday. It was shown by the discussion that there is not much room for economy in this direction other than that already brought about by restrictions, except in respect of the extravagant lighting that, in unprohibited hours, occurs outside shops, theatres, cinemas, and such-like places purely for the purpose of attracting the public. In our comment, it was pointed out that this useless waste of light means a consumption of fuel which can be ill-afforded during the war, and at any time some of the lighting is sheer extravagance. The matter has not escaped the attention of the Coal Controller or his advisers: for, by the Advertisement Lights Order, which is dated May 22 (the day the comment appeared in the "JOURNAL"), but which was not published in the newspapers till the 29th, the Home Secretary, after consultation with the Coal Controller, "with the view of checking the consumption of gas and electricity for certain forms of unnecessary lighting," prohibits altogether the use of sky signs and other illuminated advertisements, and lights outside or at the entrances to shops or theatres, cinemas, and other places of amusement, save such as may be approved by the police as necessary for the safety of the public. This applies to all hours before or after dark. The Order goes further, and interdicts the retention of the interior lighting of shop windows after the shops are closed to customers. This will effectually put an end to the waste; and it is to be hoped that, after the war, the present prohibition will result in regulation which will end the exposure, without adequate screening, of high-power glaring lights outside premises, which are not only unnecessary, but are harmful to the sight of pedestrians and drivers. This is a matter that might be the subject of a recommendation by the Joint Committee on Illuminating Engineering (the constitution of which will be found in our issue for May 22, p. 335) which has been appointed by the Department for Scientific and Industrial Research. Vulgar excess in lighting is not scientific, but it is injurious, and is only favoured by those who wish to outdo their neighbours. If extravagance is necessary to make a tradesmen's goods sell, then let it take a less nocuous form. The patrons of excessive lighting are often those whose goods are cheap and nasty.

Short Weight in Coal Deliveries.

Complaints have for some time been rife as to the excessive percentage of incombustible material that there is in coal as delivered, and which depreciates its per ton value for gas and coke making and its yield of other products. Incombustibles are no good for these purposes. There is no product obtainable from them; and they cost as much to handle, occupy as much space in the retorts, and demand as much fuel as an equal weight of productive material. This excess is put down to the war. When combined with it there are short-weight deliveries, small wonder that the cost of coal in relation to production exceeds the actual difference in the price per ton of the coal. Short weight has been the source of increasing irritation of late. It is not a matter that can be ignored when—not one truck, but many succeeding ones are found to "weigh out" as much as 5 cwt. and more short of the declared quantity. It is rarely the mistake of overweight is made, and then never in truck after truck, as in the case of underweight. The "Iron and Coal Trades Review" has felt called upon to deal with the question, and to marshal all the reasons of which it knows that may account for the trouble, which has been accentuated since the departure of the days when collieries loaded and railways carried 21 cwt., and afterwards 20½ cwt. to the ton. Our contemporary suggests that some of the weighing clerks at the collieries are new at the work. Then they might reverse their errors a little more frequently. Evaporation has to be considered in the case of washed coal. Washed coal has been a diminishing quantity during the war. It is pointed out that thoroughly wet coal weighs about 10 lbs. per ton more than when dry; so that the difference on a truck would be round about 1 cwt., assuming the bulk got completely dry (which is hardly likely) during a journey. There have been comparatively few weeks when this could happen this year. There are accidental—and perhaps other—losses *en route;* and the weighing of trucks coupled together does not make for accuracy. The idea that pits would give short weight may be dismissed as "nonsensical;" for (notwithstanding the opinions of some ill-natured people) they have still reputations to lose. This depends on the people at the pit. Altogether this question of short weight is a nice one. Natural causes—such as evaporation—are not sufficient to accounnt for the entire loss; and if the loss was all accidental, railway tracks should be coated with coal through cumulative contributions. Then with whom does the fault rest? Echo answers, "With whom?"

Women's Work.

Though primarily intended to demonstrate to engineering and other industries engaged on the manufacture of munitions the extent to which women can be employed upon responsible work of all kinds, there is an object-lesson to employers generally in the series of exhibitions of women's work which have been arranged for various centres by the Labour Supply Department of the Ministry of Munitions. The first of the exhibitions was held in London some two or three months ago; and the second, which is now taking place in Bristol, contains a much greater variety of

specimens of work than were available for the other. The importance of employing women as far as possible to replace men eligible for military service is by this time generally understood; but no doubt there are still people who are uncertain exactly how far it is possible to do so. They may be encouraged to make bold experiments by the declaration of the Department named that "the work which women have proved themselves capable of doing successfully, both from the technical and economic standpoints, is wonderful in its variety, and now comprises processes which require a very high degree of skill." As indicating the nature of the experience gained in the few weeks that have elapsed since the first exhibition, it may be mentioned that the new specimens now shown embrace a fine collection of breech mechanism details for several sizes of guns; while noteworthy additions have also been made to the collection of gauges, cutters, and tool room work of all kinds. With regard to the hundreds of photographs which are used to illustrate the employment of women on machines and processes of which it is impracticable to furnish samples, it need only be said that the variety here is as great as in the case of the actual specimens of work done. Not only have women shown the will to take a great share in the present struggle, but, what is at least equally important, they have, as remarked by the Labour Supply Department, proved their capacity to do so.

PERSONAL.

In the list of officers mentioned in despatches by Sir Douglas Haig is the name of Captain W. D. CHESHIRE, of the Lancashire Fusiliers, eldest son of Mr. William Cheshire, of Edgbaston, Birmingham, who is well known in the gas industry as a Director of Messrs. Parkinson and W. & B. Cowan, Ltd. Captain Cheshire enlisted at the outbreak of war, and obtained a commission in March, 1915. He was made Captain in August last, and has been awarded the Albert Medal. Before the war, he assisted his father at Bell Barn Road Works, Birmingham. He received his technical training at Birmingham University, and at the firm's works in Cottage Lane, City Road, E.C.

It is understood that Sir HENRY BIRCHENOUGH, K.C.M.G., has been appointed Chairman of the Paper Commission, in succession to Sir Thomas Whittaker. Sir Henry is recognized as an authority on politico-economic questions. His knowledge of business and commercial matters is not only theoretical, but practical, as for some years he, as a Director of the British South Africa Company, has taken a prominent part in shaping the progressive policy of the Board. He is also a Director of other South African enterprises, principally in Rhodesia, and of several gas undertakings—among others, the Imperial Continental Gas Association, Continental Union Gas Company, and Danish Gas Company.

Among the officers mentioned in Sir Douglas Haig's recent despatches, as deserving of special mention for distinguished and gallant services and devotion to duty, is Captain H. SHEWRING, son of Mr. W. J. Shewring, of West Bromwich. Captain Shewring, who was also mentioned in Sir Douglas Haig's despatch in the Somme battle, was articled to Mr. H. E. Copp, the late Manager of the West Bromwich Gas-Works, and now of Etruria. On the outbreak of war he enlisted in the 1st Birmingham Battalion. In March, 1915, he obtained a commission in the Royal Warwickshire Regiment, and four months later left England for France. He was wounded in July, 1916, and only a few weeks ago he was home on sick leave.

It was reported by the Gas Committee at a recent meeting of the Yeovil Town Council that, after having been in charge of the gas-works undertaking, under both Company and Council, for the long period of 46 years, Mr. EDWARD HOWELL, the Secretary and Manager, had expressed his desire to retire, as from Sept. 30 next. The Council have recorded their high appreciation of Mr. Howell's valuable and efficient work, and are retaining his services in an advisory capacity for a term of three years. An interesting fact is that Mr. Howell was the first Manager to ask for, and obtain, compensation on the transfer of a gas-works to a purchasing corporation. The successor to the position he is relinquishing is his Assistant, Mr. GEORGE FENWICK, a son of Mr. J. B. Fenwick, of Retford.

A joint meeting of the Gas and Water Committees of the Oldham Town Council has been held to consider the question of what changes (if any) were to be made in the administration and staff of the gas and water departments, in view of the resignation through ill-health of the General Manager, Mr. Arthur Andrew. With Mr. Andrew as General Manager of both departments, there were Mr. T. Duxbury as Gas Engineer and Works Manager, Mr. C. J. Batley as Water Engineer, and Mr. I. H. Massey as Assistant General Manager. The Committees decided to recommend to the Council the appointment of Mr. Massey as Superintendent of the Distribution Department of the undertakings, and of Mr. Ernest Parry, who was Chief Clerk, as Superintendent of the commercial side of the undertakings. The allocation of duties and the salaries to be paid will be considered at a future meeting.

LIEUT. PERCY T. ARMSTRONG, R.N.V.R.

By an explosion last week at an aerodrome in Kent, presumed to have been caused by a spark coming in contact with a mixture of hydrogen gas and air, Lieutenant Percy T. Armstrong, of the R.N.V.R., and a mechanic were unfortunately killed.

As a youth, Lieutenant Armstrong was apprenticed to the well-known engineering firm of Messrs. John Abbot & Co., of Gateshead, after which he served for a short time on the technical staff of the Walker and Wallsend Gas Company, of which his father (Mr. C. H. Armstrong) is Secretary. He subsequently completed his technical and scientific training by taking a two-years' course of study under the direction of Prof. Bone in the Fuel Department of the Leeds University, at the end of which he took the University Diploma in Gas Engineering. He was afterwards further associated with Prof. Bone in his researches upon surface combustion; and for a time he was on the technical staff of Radiant Heating, Ltd. In this connection he had a good deal to do with the starting-up of the first surface combustion boilers of the Skinningrove Iron-Works. Later on, he joined the staff of Messrs. R. & J. Dempster, of Manchester. At the outbreak of the war, he was engaged as Engineer in superintending the erection of a low-temperature distillation plant near Barnsley.

AN APPRECIATION.

By Prof. WILLIAM A. BONE, Imperial College of Science and Technology, London.

The news of the accidental death of this gifted young officer, as the result of a gas explosion, will have come as a great personal sorrow to many of both his own and his father's friends, and to none more so than to myself, who was privileged to be his friend and teacher at Leeds University, and to be further associated with him in research work afterwards.

And now that death has removed him from our midst, I should like, as one who knew him intimately and well, to say a few words in appreciation of his sterling qualities as a man. I can well remember—as though it were but yesterday—his coming to see me (I was then staying in Stockton-on-Tees) about the possibility of his taking up a course of study under my direction in the new fuel laboratories at Leeds University, which had then just been opened, and how at that interview he produced in my mind a peculiar feeling of confidence in his character, which all our subsequent intercourse proved had not been misplaced, and which deepened on my part into absolute trust and admiration.

I have had, it is true, more brilliant pupils, so far as merely academic attainments were concerned; but for intellectual honesty, sheer determination and tenacity of purpose, unfaltering industry, and unselfish devotion to duty he was surpassed by none. I found him absolutely reliable in anything which he undertook; and he never once failed me. In work outside the University he showed, not only a marked capacity for handling men, but also considerable resourcefulness in overcoming difficulties. Always alert and cheerful, endowed with a rare stock of common sense and genial humour, combined with a sturdy independence of mind, he was *par excellence* the man for an emergency of any kind. The value of his knowledge and trained experience was always multiplied many times by his character and sense of duty.

The premature end of a career so full of promise and potentiality is, indeed, a grievous loss both to the gas industry and to the nation. And those of us who knew him intimately will ever remember him as a shining and inspiring example of daily loyalty to the apostolic injunction—"Whatsoever thy hand findeth to do do it with thy might."

OBITUARY.

Mr. R. F. LANDER, formerly one of the outside staff of the Davis Gas Stove Company, Ltd., who enlisted in March, 1916, was killed in action on the Western Front on the 3rd ult.

The Secretary of the Institution of Gas Engineers asks us to say that he has just received the regretted intimation that Mr. BERESFORD F. PARSONS, Student of the Institution, was killed in a flying accident in January last.

Calorific Standard Orders.—The Board of Trade intimate that they have made Orders under the Gas (Standard of Calorific Power) Act, 1916, for the Crowborough District Gas Company and the Swansea Gas Light Company. The Oldbury Urban District Council have applied to the Local Government Board for an Order fixing a calorific power standard of 500 B.Th.U.

Birthday Honours.—A lengthy list, published yesterday, of honours conferred on the occasion of the celebration by the King of the fifty-second anniversary of his birthday, includes the names of Sir Philip Magnus, M.P. (who has done so much work in connection with education), and Sir Robert Hadfield, (the President of the Society of British Gas Industries), who are given Baronetcies. Among the new Knights are Mr. W. H. Cowan, M.P. (a Director of Messrs. Parkinson and W. & B. Cowan, Ltd.), and Dr. R. T. Glazebrook, C.B. (Director of the National Physical Laboratory). Mr. W. F. Marwood, C.B. (Second Secretary to the Board of Trade), is promoted to K.C.B.

THE INSTITUTION OF GAS ENGINEERS.

MEETING TUESDAY, JUNE 5, 1917.

PRESIDENTIAL ADDRESS DELIVERED BY

Mr. ARTHUR E. BROADBERRY, M.Inst.C.E., of Tottenham.

Gentlemen,—When three years ago the Institution did me the honour to invite me to become a Vice-President, it was only a few short months before the outbreak of the disastrous war which, in order to satisfy the ambitious desire for world power on the part of the German Emperor and his detestable Court and advisers, Europe—nay, the whole world—was plunged into devastating chaos so far as civilization is concerned. Yet no immediate sign appeared to cloud the outlook; and I had visions that, by the time my year of office came, many of the innumerable problems which were rapidly ripening in our industry would be nearing fruition. I pictured some of the schemes of low-temperature carbonization developing on more definite lines at the hands of men of experience who were giving the subject deep thought. There were new systems—more scientific systems—of carbonization being born in America. Not only that, but new systems of condensation and subsequent treatment of the gas, which were full of promise, and which, if they did not revolutionize the whole process of manufacture, would without doubt produce such a progressive movement as had not been seen for a hundred years. There were scientific investigations pending—research work which would become more and more important as the new methods of production became established. There were also innumerable and important possibilities of increasing the usefulness of gas in commercial industry, as well as more particularly in the great chemical industry, to which gas making is so nearly allied.

The all-absorbing war has put a stop for the time being to many, but not all, of these matters. Some of them it has brought out into a clearer light, and has laid the foundation for much more work in the future. One cannot help thinking, when one contemplates the enormous waste of this war, what benefits might have been bestowed on mankind if all the energy and all the expense of the war had been devoted to the constructional betterment of the world, instead of to so much destruction.

Shall we profit by the war's lessons? We should do. We want a freer expenditure on scientific and industrial research. Will the funds be forthcoming after all the waste which is now going on? An extremely small fraction would be all-sufficient for great achievements. Is the Institution properly constituted at present to undertake, and is it properly endowed to carry on, the important work which lies before it in the future? These and many other questions crowd into one's mind as one contemplates the industry's future. I do not pretend to be able to solve them; but I venture to offer some suggestions.

Organization in the Industry.

The war has brought into being a new body—the National Gas Council. Perhaps it would be more true to say it has warmed into life a much-required combination which had too long lain dormant. The late Mr. Edward Allen, when President of the Institution, saw, with that clear insight which was characteristic of him, that some co-operation was required between the engineers in matters of high policy with those who had administrative authority to which the engineers themselves were subservient. Co-operation and advice were also required from other men of eminent ability who were inherently interested in the success of the gas industry as plant manufacturers, and who in this capacity had special knowledge of high value. He, therefore, devised a "Grand Council," consisting of seven members from each of the following bodies: The Institution of Gas Engineers, the British Commercial Gas Association, and the Society of British Gas Industries.

Whether it was the most ideal arrangement may be open to doubt; but it was a positive proposition—it was something, which is generally better than nothing, but it lacked the spark of life. It required war conditions to vitalize it. The war came; and it was then felt that, composed as it was, it was not justly balanced. The manufacturers were directly represented by the Society of British Gas Industries and indirectly by the British Commercial Gas Association. The Institution was also similarly placed. The administrative element—those men who hold the higher power—only came in by a partial representation from the British Commercial Gas Association. It was, therefore, decided that the Gas Companies' Protection Association should also be invited to join. There is yet something lacking, as the latter body does not include municipally owned undertakings. No doubt, in course of time it will right itself—perhaps in the broadening of the Gas Companies' Protection Association, by leaving out the limiting word "companies." In any case, the National Gas Council is doing good work. It has plenty to do, and should constantly have our warmest help and support—both morally and financially. Probably it will become a permanent part of the industry's established organization.

There need be no fear that the Institution will be submerged. The maintenance and development of the industry must always be in the hands of the engineers and chemists, and must depend on them; but they should be backed in the future much more by the administrators than they have been in the past.

If more effective work is to be done, the funds of the Institution must be augmented. It is unreasonable to expect funds to be raised mostly from the subscriptions of members. It should be borne in mind that, by the constitution of the Institution, and by the peculiarity of the industry itself, a great range exists in the emoluments of those who are entitled to membership. Undertakings range from the colossal Gas Light and Coke Company down to village works. The very small works cannot employ men of very high training, from the mere fact that the size of the undertaking does not allow of a high salary. Yet it would be unwise to disqualify the engineer or manager of a small works from membership. Napoleon's saying: "Every French soldier carries a French field-marshal's baton in his knapsack," stands figuratively good in our industry; and many a man starting low down, rises by sheer ability to a good position. No one would have it otherwise. Even the least conspicuous often drops a word of wisdom to those who are higher placed; and if membership of the Institution means, as it should mean, that the member is helped in his work by belonging to it, I doubt if there should be any restriction on the score of the size of the works.

It has been suggested occasionally that membership of the Institution should depend on the passing of an examination; but I doubt if the time is at present ripe for us to deny membership on the score of inability to pass a qualifying examination. Such a qualification wisely exists in many other technical institutions which have not the same pronounced peculiarity as that above referred to. For such qualification the doors of the Institution of Civil Engineers are always open to our members; and it is desirable, in the interests of the industry, that as many of our members as possible should make use of the opportunity. It is not the member alone who benefits from his membership of our Institution. There is another benefit which I fear is not always recognized. I would go even further and say it rarely is, and that is the benefit to the undertaking which the member controls under either his directors or his committee. When boards and committees are brought right up against the work of the Institution and the kindred Associations, they do realize the importance of the work generously and liberally; but do they have it ever-present in their minds that their engineer or their manager is helped in his work—in their work—by his membership?

Subscriptions.

The time has come when a scheme should be devised by which the undertakings, all of which benefit by the Institution's work, should be asked to subscribe towards the cost of the work. It may be said that many of them do so now in conjunction with the advertising and educational propaganda

work which is so well carried on by our vigorous offspring, the British Commercial Gas Association, of which we are all so justly proud. It is true that in the scheme of subscription for the purposes of this excellent Association, which is nominally 2s. 6d. per million cubic feet made, it is specified that not more than 10 p.ct. is to be retained for research work. But we have never retained the full amount, as we have always been anxious to help the advertising campaign all we could; and a large proportion of the money spent in the past on research has had to come from the members' subscriptions instead.

Surely the time has come now when all the undertakings might be asked to double the subscription; and the 10 p.ct. could then definitely be allocated to research work without fear of weakening the advertising campaign.

Five shillings per million cubic feet made—what does it mean? Merely 0·06d. per 1000 c.ft. (the cost of, say, a cab fare); about 1s. 6d. per £100 of total income. Surely it is a just way to increase the Institution's fund for effective work. It would not eventually be a cost, because it would be a wise expenditure to obtain greater efficiency as well as more business, and thus it would reduce the cost.

Then as to members' subscriptions. One wonders how it ever came about that they were fixed at the low sum of one guinea. This has descended to us from our ancestors, the "Gas Institute." Our other ancestor, the "Incorporated Institution of Gas Engineers," charged two guineas. Some members belonged to both; and these willingly paid three guineas per annum. The time surely has come when the subscriptions should be raised to two guineas at least.

In expensive times like these, one does not like to ask for increased subscriptions; but as most of the increased cost may become permanent, salaries will no doubt rise, and the small additional subscription will not be felt.

Qualification for Membership.

I should now like to say a few words as to qualification for membership. We are far too exclusive. We detract from our usefulness by not opening our doors widely to our chemists, who constantly become more important in the industry. Then, again, there are many eminent men, trained engineers, who are debarred by our requirement that they should not be engaged in trade or business dealings with gas undertakings. The loss is our own. We admire and respect the men; yet we shut our doors to them. I need only mention one name as being typical of what I mean, and remark incidentally how gladly we snatched the opportunity, the loophole in our rules, which entitled us to ask Sir Arthur Duckham to become an Honorary Member as soon as his deserved distinction allowed us to do so. But why must he be an "Honorary Member"? It was not by excluding men such as these that other technical institutions made their name and influence. Others there are who are entirely interested in the industry's welfare—such as the secretaries and the chief inspectors, who would probably gladly join the Institution as associates, and increase our very short list, which at present consists of two. There should also be some special provision in some cognate class of members for such men as directors and committeemen who devote their time and energy to the benefit of the industry, and who in so many cases are of such importance that we can ill-afford to be without them. The student class I shall refer to at a later stage, when referring to the question of education.

Another very useful class of professional men has been created by the coming of the bye-product coke-oven industry. There is already so much in common between the two industries, and there is likely to be so much more in the coming developments both inherent, and as a result of the hoped-for fostering of the chemical industry in England after the war, that it would seem unnatural for the two similar industries to keep apart when they could be so mutually helpful in the cause of national good. The coke industry has its own Association for its own domestic interests; but worthy men should have a very hearty welcome if they wish to join our Institution.

Many other technical and scientific societies and institutions, both at home and overseas, exist to which we are entitled to apply for membership. Why should not we be equally open to them? There are many gas engineers members of the Society of British Gas Industries. Whatever the reasons for the exclusion of engineers engaged in trade and commerce may have been in the past, the clean tenets of the Society of British Gas Industries should be sufficient guarantee of their members for the future. Outsiders who do not subscribe to their standards of integrity may still be open to doubt; but so long as the Society keeps clear of "rings" and aggressive "combines," their members should be worthy of membership if trained as gas engineers. We all know the reasons for exclusion in the past; but then there was no Society of British Gas Industries. Times change, and institutions must change with them or become back-numbers. It would be foolish to shut our eyes to the fact that the Institution has reached a critical stage of its career. It has long been felt that it is too fettered and repressed by its constitution to be able to breathe freely—too confined to be able to grow and develop the strength necessary to deal with the heavy and important tasks which lie before it. It would also be foolish to allow it to become moribund. But it is bound to do so, if we continue to enclose ourselves inside the gas-works, and say that the only gas engineersare those in charge of works. We should remember there are others outside the works, and gas engineering does not consist only of gas making. The Institution is in the favoured position that it has traditional and fiducial responsibilities which are partly expressed in trusteeships for the Livesey Professorship, the Corbet Woodall Scholarship, and the Birmingham Medal Fund, and partly by the fact that it possesses accumulated funds for certain specific purposes. It has its Building Fund. An important step has been taken by the formation of an influential Building Committee, which it is devoutly to be hoped will accomplish the task to which it has set its hand.

The Building Scheme.

When the building will come is a matter which rests partly on our own endeavours, partly on our hope that the services we have rendered, and still hope to render increasingly in the future, may create in the minds of those who hold the purse strings of the industry a desire to establish a suitable home for the Institution and all the allied societies and councils, and partly on Dame Fortune, who may send us substantial help from some philanthropic source at this time when the need for national effort applies, perhaps, more to the gas industry than to any other. Too long we have lagged behind the times.

So far, none of our kindred Associations have been in a position to devote any funds to the purpose of establishing a home for gas; and a real Institution of Gas Engineering ought now to be established, where we can accommodate all existing and future sections of the industry. The Institution, as the oldest established, most responsible, and permanently representative body, should be the figure head.

The Benevolent Fund.

Funds are urgently wanted for the purpose, of course; and my hope is that through the new Building Committee, among their other methods, a special appeal may be made to all members to subscribe to the Building Fund in the same way as they now do to the Benevolent Fund. Both are deserving objects, and should be helped according to the means of the individual member. I would not wish to harm the Benevolent Fund by this extra claim. On the contrary, I want to make a special appeal to members to help all in their power the fund for benevolence. Unfortunately, a feeling has become spread abroad that the fund is not doing a useful work; and, consequently, it has never had the support it deserves. I confess, personally, that up to the time of my taking office, I had no idea of the great amount of good it has done; nor of the inadequacy of the subscriptions to meet the pressing needs of those left behind by our professional brethren who have fallen by the way. If I had known earlier the good work which is being done, I would have become a subscriber earlier; and I appeal most strongly to all the members who do not already subscribe to make some small sacrifice to help so deserving a fund. It is a matter so easily forgotten in the press of business; but it means so much to helpless widows and orphans when they are unfortunately left unprovided for, that I do ask very earnestly that to-day each member will undertake to subscribe to the fund.

I have heard that a feeling exists that the fact that some part of the Benevolent Fund having been invested is proof that more money is subscribed than is wanted. This is quite wrong. Much of that which is invested has been invested compulsorily, as the expressed condition of the donation. It was a wise stipulation of the donors to establish the fund firmly by endowment; and it is to be hoped

that, year by year, sufficient funds may come in to meet all current needs, and leave a margin of reserve further to solidify and strengthen it.

Research Work—Government Assistance.

So far I have dwelt largely on the need for more funds; and I might conclude this portion by reminding the members of the old adage, "God helps those who help themselves." A tangible substantiation is the fact that the Government Advisory Committee on Research do undoubtedly work on this principle; and if my suggestions can be applied effectively, so that from £2000 to £3000 or more can be spent yearly on research (and I think I could construct a balance-sheet, on the lines I have indicated, that would fully justify it), the Government will probably apply an equal sum, and gas should soon begin to occupy the place in commercial economy which it would have attained long ago but for lack of supporting funds.

More than an Annual Meeting Required.

Another reform, which in my opinion would greatly benefit the Institution, would be to hold meetings more frequently than once a year. There are many disadvantages in crowding all the year's work into one meeting, and in my opinion great improvement would be found if the meetings were held quarterly at least.

Sliding-Scale Reform.

War has cast a searching light on many things, and shown them in a different aspect from that in which they usually appear. The sliding-scale is one of the conspicuous examples. When times were normal, and the world war unthought of, the sliding-scale appeared to be more or less perfect; but under war conditions its effect has been very harsh on gas shareholders. War was not their fault. War brought them burdens of their own in high prices for their own requirements; but it also brought them the double burden of increased cost of gas production, which not only put up the price of gas and reduced their dividends, and so gave them less income to pay for the increased cost of living, but it also reduced the capital value of their shares. It is doubtful if things will ever be as they were; and therefore the time may come when in new Bills in Parliament the balance should be adjusted by the standard price under all sliding-scale companies being advanced. But the time is not yet. It cannot be done in war time. How much of the disadvantage is permanent can only be known when the immediate and temporary effects of the war are passed.

Perhaps the sliding-scale motive has proved a myth in another way. It produced the desire to economize in every way, and perhaps that may in a measure account for the inadequate pushing and support of expenditure for research and investigation to which allusion has already been made. In some cases it is said to have had the effect of unduly restricting wise expenditure on upkeep and on a safe margin of reserve plant. Unfortunately, it has this tendency. It is quite easy of proof that a shilling saved to-day costs two shillings to-morrow. Necessary extensions, delayed a year too long to save a year's interest, may eventually cost more to the consumer and shareholder. At present the sliding-scale fetish is under suspicion, and unless it can establish its position after war conditions, it may prove to be quite a false god.

Co-Partnership under War Conditions.

We applied the sliding-scale to labour; and again the fierce light of war has searched out aspects which in the ordinary way would never have been expected. Co-partnership was based upon the sliding-scale. It postulated these four essential features:

First, security of employment for the worker.
Second, beneficial wage increase for good and effective combined work.
Third, accumulation of savings, impossible for voluntary thrift.
Fourth, unifying of employers' and workers' interests with those of the consumers.

It was a beautiful moral and sentimental ideal, and appeared to have a sound material foundation. War conditions have put it to a severe test. As the ultimate strength of any substance or body is ascertained only when it is tested to destruction, so co-partnership's real efficiency will never be known unless it reaches the point when it is destroyed. Some materials when tested to a standard may rigidly pass the test, although they may be on the point of breaking. Others show signs of yielding before the critical point is actually reached; and, judged by the test of war conditions, I fear co-partnership comes in this category. Let us consider it in regard to each of the postulates above enumerated.

1. The security of employment to the worker. Has this any binding influence? I strongly suspect that, in nearly every case, it has been found that recently every man has shown a disinclination to be bound by any agreement. No doubt the original cause was the unaccountable action of the Government in offering absurdly high wages to attract men to the manufacture of arms and munitions in the early stages of the war. Those who were not bound by long agreements took the first opportunity to rush for the "big shilling." Undoubtedly the high wages had an unsettling effect on all labour. No one yet has been able to explain why they were offered. They were quite unnecessary. One would have thought patriotism would have been a sufficient incentive to a host of workers; that natural affection for their relatives risking their lives would have prompted willing workers to do their bit in the factories. But the mistake was made, and then there immediately ensued a competition of high rates to obtain and retain men. No wonder the twelve months' agreement has now become unpopular.

2. Beneficial wage increase for good and effective combined work. When the rising price of gas caused by war conditions produced a reduction in the co-partnership bonus simultaneously with rapidly rising wages elsewhere, this phase of the scheme became non-existent.

3. Accumulation of savings impossible with voluntary thrift. What was the effect of this under war conditions? There existed in many cases very considerable sums accumulated as the effect of co-partnership. The value was known to be there; but the money could only be touched by leaving the service. This was another inducement to avoid any further agreement, and to leave with the knowledge that increasing demand for labour made employment elsewhere easy to procure, while providing plenty of ready cash at the same time. Add to this the fact that the more thoughtful ones realized that, owing to the sliding-scale, the dividends were becoming reduced, and the value of the stock in which they were compelled to invest was rapidly falling. They saw that the longer they remained in the service, the less they would receive for their invested savings when they did at last change their employment; and it is easy to imagine co-partnership was losing its hold.

4. The unifying of all interests. That it is impossible to co-ordinate what does not exist, requires no demonstration; and as in many cases no interest is left in co-partnership, this last point has not been upheld.

There may be, and no doubt are, cases where the test has not been so severe as at Tottenham. There have been exceptional circumstances in this case it must be admitted. First, a pre-war agreement prevented the early raising of the price of gas; and this had the inevitable effect of a correspondingly heavy rise subsequently, which carried the price above the co-partnership standard. Secondly, the fact that reliance has long been placed on carburetted water gas, which in normal times has enabled Tottenham to place itself in the forefront of low-priced undertakings. War has produced a state of affairs that makes carburetted water gas production absolutely ruinous; yet Tottenham, by reason of delays in the completion of the new coal-gas section designed for a production of $4\frac{3}{4}$ million cubic feet per day, has been bound to it, and has been unable to escape.

Gas a Compulsory Supply.

This brings into a strong light another peculiarity of the gas industry not generally appreciated by the ordinary public, in the fact that it is not in the power of gas undertakings to regulate the volume of their own business. The public help themselves, and the undertaking is bound to fulfil the demands. It seems a strange state of affairs when an increase of trade is undesirable, and when a large decrease would be welcomed but cannot voluntarily be obtained. Yet this state has existed in Tottenham for many months. If we could have reduced our output by one-half we should have been thousands of pounds better off, because we could have dropped the manufacture of carburetted water gas.

War will not last for ever, and co-partnership may come again into its own; but as another war may come, we should ask ourselves, Is it possible, in order to guard against a

repetition of this severe test of co-partnership, that it can so be strengthened as to withstand the strain? I believe it is.

WORKERS' SUPPLY.

My late friend and colleague, Mr. Ebenezer Topley, whose death was not merely a blow and an irreparable loss to me and to the Company we jointly served, but I venture to say to the whole gas industry, in which his great and clear train of thought was just beginning to be felt, foresaw the need of this reinforcement, and piecing together the possibilities, he devised a scheme of pension. It is a scheme which, given time to mature, will, in my opinion, become the chief prop and stay of the co-partnership system. He realized that a pension scheme to be equitable and actuarily sound and be equally divided between the employer and the employee would bear financially so hardly on the employee that it would not appeal to him nor enlist his sympathy. In connection with co-partnership, however, he foresaw the possibility of helping the worker to subscribe his half easily towards the fund.

In the beneficent co-partnership system there was the struggling worker, otherwise hopelessly unable to save as a provision against old age, being helped to invest in the funds of his employers by a scheme of bonus on his wages, one-half of which was withdrawable and one-half compulsorily to be invested in the funds of the company.

A very good investment, no doubt, in the light of things as they then existed, though not so good at the present moment of depreciated value. He thought, why should not the worker invest part in a still better scheme to provide himself with a good pension. He framed a plan which was declared to be actuarily sound, whereby the pension fund should be subscribed to equally by the company and co-partner, but only one-third of the co-partner's subscription should be deducted from his salary or wages. The other two-thirds should be charged against his investment half of the co-partnership bonus. Surely a better investment even than the company's funds!

After allowing a period of ten years for maturing, it gave 1-60th of the maximum pay by way of pension for each year's service up to a maximum of forty years. Thus a man with even only 30s. per week would obtain 20s. a week pension at the age of 65 years (the retiring age) if he had been forty years in the company's service.

The scheme was carefully elaborated and submitted to the co-partners, with the suggestion that they should agree not only to the investment half of their bonus being called upon to subscribe, but also that the withdrawable half should be equally charged. This meant that the worker's subscription should be equally paid by one-third deducted from his wages, one-third from the investment half of the bonus, and one-third from the withdrawable half.

The strength of the true and admirable spirit of co-partnership as it then existed may be not only imagined but fully appreciated when I record that at a meeting held under the presidency of the late Sir Corbet Woodall, one of the workmen proposed an amendment to the effect that the whole of the two-thirds should be charged against the withdrawable half, so as to leave the investment half intact; and it was carried enthusiastically.

The gratification, satisfaction—nay, I might almost say amazement and delight—of Sir Corbet, whose whole heart and soul were wrapped in the welfare of the workers, will be best felt by those who knew him best. I can only record that he could scarcely speak for emotion. War has changed all this splendid spirit, which was drawing employer and employed closer together in a bond of sympathy. What of the future? Mr. Topley's great scheme, splendid as it was, counted on co-partnership being invulnerable; but co-partnership under war conditions has not altogether been strong enough to withstand disturbing elements, and I begin to doubt if, even strengthened by such a well-devised pension scheme, it can always bind the employee to his job.

This pension plan provided for his leaving, and gave back to the employee all he had paid in, *plus* interest, if he left or were discharged from the company's service. In the event of his death before the pension commenced, it gave his nominee all he had paid in, *plus* an equal amount subscribed by the company.

After the experience of war conditions, I believe I would advocate carrying the method further by a pension fund, subscribed entirely by the employer, giving the same extent of benefit. In any case, it is the employer who originally pays the money, whether by wages or by co-partnership. Then why not subscribe the whole of the pension fund direct? Critics may object that a man might be discharged just before he became entitled to a pension. Such criticism is easiiy met. The man would undoubtedly have a vested interest; and if unjustifiably discharged he would have to be compensated on an equitable scale.

In the light of past experience, I am inclined to think that such a system would be more satisfactory both to the employers and employed, and would give more benefits to both than the present co-partnership system, which in so many cases has failed to maintain the bond of mutual interest which was expected of it.

Now, however, when we are all having our patience sorely tried, it would perhaps be unwise to form too definite an opinion. We must remember that nearly 40 p.ct. of our regular men are in the army. This fact in itself perhaps shows that they are generally, and as a class, the best of our men who are gone, and that those who remain, *plus* the temporary hands, with whom we have to carry on are not a good or fair criterion of the average normal man.

WOMAN LABOUR.

On the question of labour I would like to say a word in praise of the women. Woman has certainly won a new place for herself in the world's work. She has been "doing her bit" in a way that should put some of the opposite sex to shame. No one would have believed that it would have become a common practice for women to be coke-loading, oxide turning, gasholder painting, engine driving, machine driving, and conducting many other operations in gas-works. They can do the work, and they are doing it well; and those who are in trouble through depletion of staff, whether caused by recruiting or defections, need have no hesitation about asking women to take up the work. I urge all members who have hesitated to dilute their labour with women to do it now, so as to release all fit men, and clear the industry of the accusation that we form a shelter for cowards.

I do not hesitate to say that it is a national disgrace that at times like these, when nearly everyone in the land has friends and relatives risking their lives in the war for us—for the whole community—there can be found so many men who not only avoid the army, but who are so callous, so unpatriotic, and so unprincipled as to engage in a strike, as in recent cases, or even work slackly when they must know that such action on their part costs thousands of lives. It must be that they have not the same nobility of soul as those who willingly sustain wounds and death to keep the heritage left us by our fathers.

GAS DILUTION.

Much complaint has been made of the difficulty of obtaining materials. Undoubtedly there have been difficulties. War is not an armchair pastime. We must face the difficulties and do our best. Coal has been, is, and will be a great source of anxiety. It has been bad. Even well-known gas coals, because of scarcity of labour, have been ar below the usual standard of quality. Unknown coals have had to be tried, and the difficulties have often been increased thereby.

Increased quantities of gas have been required from inferior coals, with the inevitable result that quality has suffered. In many cases this has been unavoidable; but I want to sound a warning note on this important subject. The successful future of the industry may be materially affected if we yield to the temptation to obtain too much yield per ton—to obtain more bulk than really comes by distillation in the retorts. The war has done permanent injury enough to the industry. Our patriotic willingness to help all we can to win the war has no doubt been to our detriment; and it will be foolish indeed for us to harm ourselves more by allowing too much inert and incombustible constituents to go out in our product. Much attention is now being given to the subject. It will be the Institution's work to see that the best interests of the industry are properly maintained.

As your President, I have received an important letter from the Controller of Mines, which gives a good line and sound advice. It will be observed he realizes that even the moderate standard of calorific value which is now generally accepted cannot be maintained in all cases under war conditions; but for works possessing water-gas plant he points

a course which should undoubtedly be followed. I give the letter in full:

Board of Trade, Whitehall,
May 1, 1917.

CONTROL OF COAL MINES.

Dear Sir,—Your attention is requested to the importance of bringing under the notice of the gas industry the urgent necessity of restricting, as far as possible, the quantity of coal used for gas making.

May I suggest, as a means of doing this, the substitution of water gas for coal gas to the greatest practical extent, consistent with the requirements of the Ministry of Munitions (who should be consulted in all cases), and the adaptability of the mixed coal and water gas for the industries using gas for special fuel and for lighting purposes.

I am advised that, owing to the limited supply of gas oil, a number of works provided with water-gas plants may have discontinued their use. But, if certain precautions are taken, 10 to 25 p.ct. of uncarburetted gas and a higher percentage of slightly carburetted gas can be added to the coal gas. The saving in coal, and transport of the same, to be effected by this practice if consistently carried out will be substantial, and the relief to the railways in proportion.

The urgent necessity for relieving the railways is of the utmost importance; and I therefore have to request that you will take an early opportunity of laying the matter before the members of your Council with a view to the whole subject being ventilated and the necessary steps taken as far as circumstances will allow.—Yours faithfully,

(Signed) GUY CALTHROP.

The President, Institution of Gas Engineers.

The course laid down should enable most works to send out a gas which will be nearly all combustible, and which will probably be found to be the best practice permanently in the true interest of the industry. It will make for good flame temperature, which for all purposes will probably be found to be superior to calories or candle power. It is a duty we owe not only to the State, but to the industry and to ourselves.

In connection with this same subject, I may mention that grave difficulties are ahead in regard to the supply of gas oil; and as your President I have been honoured by being asked to assist the Ministry of Munitions on an Advisory Committee to deal with the subject.

GREAT WORK AHEAD.

The work of the Livesey Professorship has been largely switched-over to war effort. This is quite fitting as relating to the industry which has gone all out in its loyalty during war. New problems will arise after the war which will render this phase of the work of the Institution of paramount importance.

One cannot see any finality in the great work which lies ahead. The whole of the nation is looking towards an immense industrial reconstruction after the war; and in this reconstruction, unless we miss our opportunities, gas will be one of the greatest factors, if not the very greatest. We must not rest now on what we have done—our task is only just commencing. In all probability many old methods will have to be swept away, existing plant modified, or else new plant erected; but as the war will revolutionize the whole world, our work must also be revolutionized to meet the changed or changing conditions.

EDUCATION PROBLEMS.

Much is at present being thought, said, and written concerning education after the war; and the subject of education for the industry should become increasingly a strong point in the Institution's programme. So far our student class has not been developed to give them any conspicuous advantage, with the result that the list is extremely small—only six.

For many years the Institution has induced some of its members to undertake the arduous and responsible duties of examiners under the City and Guilds of London Institute scheme of technical education, in "Gas Engineering" and "Gas Supply." It is a heavy and laborious task for any man to undertake and to carry out conscientiously.

At present the system is the best we have available; but it is open to some doubt whether it is the best which could be devised, and whether in the end it does full justice to the students themselves. Some of the best and most brilliant or promising may not be afforded the scope, by the set syllabus, to demonstrate their knowledge; while some may not be able to express in writing all they know of their subject. If some scheme of continuation could be devised under the auspices of the Institution, so that the end had not been reached when the student had gained his Final Honours Grade certificate, it would be an incentive to go forward. Such a continuation system might be used as a connecting link to entitle the student, by passing an intermediate examination, straightway to become a student of the Institution, and so add to the number of young men who would join the Institution by this means. When the limit of age is reached for the students' class, he could apply for transfer to associate membership, and the Council could judge whether his position and known attainments entitled him to the transfer or could call on him for a thesis or a further examination before deciding his claim.

Many young men of ability, who now drop their studies when they have finished the City and Guilds course and then drift and become unknown, would thus have an incentive to achieve further attainments; and our students' class would become a more effective feature of our organization. The subject seems one worthy of investigation by a Committee formed of those who have taught in the technical classes and schools and of those who have acted as examiners. Such a Committee might also advise as to the best course of training for gas-fitters. A higher training—an enforced training—is needed for the youths who are to become gas-fitters.

Much good voluntary work is being done by the Gas Light and Coke Company and others. But it should not be voluntary—it should be made compulsory both on the employer and employed; and it should be unlawful to hinder or neglect it, or to employ or accept service with those who do neglect it.

HENDRICKSON'S "GAS CHEMISTS' SUMMARY."

Before bringing this long and discursive address to a close, I have been asked by the Publications Committee to call attention to an extremely useful work which has been carried on by one of our associate members, which appears to have been overlooked in the stress of war time, and which for want of support may become lost to the industry. I refer to the work of Mr. A. V. Hendrickson, "The Gas Chemist's Summary." It claims to be a summary of gas literature for the year. The work is so little known that I venture to say many of our members whose work and words are quoted have no idea of its existence; while the matter it contains would be of valuable assistance to any who possess it. Those who know its worth would, I am sure, be sorry if its yearly publication were discontinued.

IN CONCLUSION—THE NEW PRESIDENT.

And now, Gentlemen, I must draw to a close by thanking you for the kind and generous support you have given me as your President during a difficult and somewhat trying year. The year's work has brought us still more closely into touch with those who can best appreciate the loyalty and patriotism of the industry, and the work it has already done and is prepared to continue. One result of this work is that I hope shortly to have the honour of proclaiming as my immediate successor in the Presidential Chair—Lord Moulton, who has consented to grace the Institution in that capacity. He will need no introduction. His eminent knowledge of technical law, and his close touch with the gas industry in his office of Director General of Explosives Supplies, render it particularly fitting that just now we should venture outside our own ranks on this occasion. Our thanks are due to Mr. Samuel Glover for standing back for one year in order to make it possible for us to enjoy the fortune of having as President one whose personality will add so much lustre to the Institution.

The present course of events proclaims the dawn of a new era, a reawakening which should be an incentive to great effort in the cause of the industry.

> "On such a full sea are we now afloat,
> And we must take the current when it serves,
> Or lose our ventures."

Gas Coal Economy and Blue Water Gas.—This week arrangements will be made for representatives of District Gas Associations, the meetings of which Mr. Thomas Glover, the Gas Engineer Adviser to the Coal Controller, has not been able to attend, to meet him in London for a little talk on the subject of gas coal economy and the use of blue water gas. This, it is thought, will be a convenient opportunity while London is being visited for the Institution meeting.

THE NATIONAL GAS COUNCIL OF GREAT BRITAIN AND IRELAND.

Report of the Executive Committee presented to the Council at its Second Meeting, on Monday, June 4.

Since its first meeting, on Nov. 15 last, which was held to confirm the rules and constitution, the following subjects have been dealt with by Committees of the Council on behalf of the industry:

(1) The Government's call for increased supplies of benzol and toluol.
(2) Coal supplies: (*a*) The "Limitation of Prices Act." (*b*) Application by the Northumberland collieries for an increase. (*c*) Appointment of Coal Controller. (*d*) Representation of the industry on the Coal Advisory Committee. (*e*) Proposed limitation of contract period. (*f*) Government request for an increased use of water gas. (*g*) Government request for an increased use of unscreened coal.
(3) Supply of labour: (*a*) Schedule of reserved occupations. (*b*) Schedule of protected occupations (position of non-certified undertakings). (*c*) Labour for stove and meter works.
(4) Supply of plant and materials: (*a*) Stove and meter works. (*b*) Gas-works.
(5) Naphthalene troubles.
(6) Prices of benzol and toluol.
(7) Market for benzol after the war.
(8) Specification for benzol for motor spirit.
(9) Tar: (*a*) Proposals for co-operative distillation. (*b*) Proposals for profit-sharing arrangement with combination of tar distillers.
(10) Calorific power standard: (*a*) Bills and Orders. (*b*) Testing for calorific power. (*c*) Pressure limit and revision period. (*d*) Proposals for limitation of diluents in gas.
(11) Sliding-scale revision.
(12) Excess profits tax.
(13) Sale of Gas Act—proposed amendment.
(14) After-war problems: (*a*) Fuel conservation. (*b*) Education.
(15) Projected Association of sulphuric acid manufacturers.
(16) Finance.

The following are brief particulars of what has been done and is proposed under these various headings, so far as it is expedient to publish information. There has, in regard to most of the subjects dealt with, been considerable correspondence with undertakings throughout the country.

THE GOVERNMENT'S CALL FOR INCREASED SUPPLIES OF BENZOL AND TOLUOL.

The Executive Committee have taken every opportunity to urge the adoption, wherever possible, of the system of washing gas with oil for the production of benzol and toluol. This action has been much appreciated by the Ministry of Munitions. It is satisfactory to know that there has been a substantial increase in the number of oil-washing plants in use the past few months.

The principal difficulties in the way of increasing, or even maintaining, the supply of raw materials for high explosives are those of obtaining supplies (1) of coal and oil, (2) of labour, and (3) of materials for the maintenance, renewal, or extension of plant both on the works and on the district. These have actively engaged, and continue to engage, the attention of the Executive.

COAL SUPPLIES.

Limitation of Prices Act.—Difficulties regarding the working of the Price of Coal (Limitation) Act, 1915, continue to arise from time to time. The Executive Committee have kept the matter under close observation, and numerous representations have been made to the Board of Trade regarding difficulties experienced in renewing contracts, and delays in delivery and transit.

Application by Northumberland Collieries for Increased Price.—A deputation, consisting of the President, the Chairman of the Executive Committee, Alderman W. Kay, and Mr. W. E. Price, appeared before the Board of Trade on Jan. 22, and entered a protest against the application of certain Northumberland collieries for an increase in the standard price. There were exceptional circumstances in the cases of these collieries (which were small ones); but the Committee were anxious to let it be felt that no such applications would go through without the voice of the gas industry being raised against them. The collieries in question have not obtained an increase in the standard price.

Appointment of Coal Controller.—There is reason to hope that the appointment by the Controller of Coal Mines (Mr. Guy Calthrop) of Mr. Thomas Glover, of Norwich, to assist him in regard to the special needs of the gas industry, will tend to reduce the difficulty of a situation that is necessarily far from an easy one.

Representation of the Gas Industry on the Coal Advisory Committee.—On the appointment of the Controller, a suggestion was made by the Executive Committee that, in view of the large proportion of the total output of coal which is dealt with by the gas industry, a representative of that industry should be elected to serve on the Advisory Committee appointed to assist him. This was not conceded; but the Committee were promised that the industry would be consulted on any matter affecting their interests should occasion arise; and the subsequent appointment of Mr. Thomas Glover to advise the Controller permanently goes further than this promise. Gas managers are advised to communicate with the Controller should they experience difficulty with regard either to prices asked or quantities offered for new contracts.

Proposed Limitation of Contract Periods.—The Chairman of the Executive Committee took immediate steps to obtain the Controller's ruling in respect to the gas industry on the published instructions that no forward contracts for coal were to be made for a longer period than three months. And it is satisfactory to report that this difficulty has been practically overcome by contracts being allowed for the usual periods, subject to the insertion of a clause to the effect that the contracts may be cancelled at an earlier date should the Controller deem it necessary.

Government Request for an Increased Use of Water Gas.—A letter has been received from the Controller of Coal Mines urging the Council to bring to the notice of the industry the necessity for restricting as far as possible the quantity of coal used for gas making and the substitution of water gas, subject to compliance with the requirements of the Ministry of Munitions, who should be consulted in all cases. The Council are, therefore, asked to endorse and emphasize this appeal, which has already been brought to the notice of the gas industry by the Council of the Institution of Gas Engineers.

Government Request for an Increased Use of Unscreened Coal.—The Ministry of Munitions sent a suggestion to the Council for the use of unscreened coal in place of screened—the idea being that screening occasioned delay of wagons at the colliery, and consequent congestion of transport. The Executive Committee, at the urgent request of the Ministry, published the letter in the Technical Press, and circularized a number of gas managers. It has now been shown, however, that the substituted use of unscreened coal would not afford much, if any, relief to the railways, and that there are other national reasons in favour of the use of screened coal by many gas-works, and the Ministry are satisfied apparently that their suggestion has, upon full consideration, been found impracticable.

SUPPLY OF LABOUR.

Schedule of Reserved Occupations.—The Council took over the work of the Joint Committee which prior to its formation had been dealing with the question of the reservation of the requisite technical and manual labour in the works, the district, and the administrative departments, and re-appointed the Committee with certain additions. On the receipt of an invitation to appear before the Reserved Occupations Committee in March to discuss the question, adjourned from a former conference with that Committee in October, of further possible recruiting from the industry accompanied by dilution and substitution, steps were taken to get in touch with the Ministry of Munitions Labour Department. As a result, an agreed list of all occupations in the industry, classified as between "skilled," "semi-skilled," and "unskilled," was prepared, and made the basis of a recommendation to the Reserved Occupations Committee at a conference at which the Ministry of Munitions Labour Department and the Director-General of National Service were represented. Up to the present, no revised list of reserved occupations has been published, though it is stated that one is in preparation and may be issued at any moment. Until it is received, all "non-certified" undertakings appear to have the same ground for the support of appeals to tribunals as formerly.

Schedule of Protected Occupations.—Meanwhile, consequent upon the debadging order, a list of "protected" occupations has been published, which gives to "certified" undertakings the protection asked for by the Council's Special Committee in respect of the industry as a whole; and for these undertakings the position appears quite satisfactory up to the present. When this schedule of protected occupations was published, and it was observed that the schedule only applied to "certified" undertakings, officials of the Ministry of Munitions Labour Department were seen, with the result that it was laid down that undertakings that could prove that they were engaged on work for the Admiralty, War Office, or Munitions works—all, in fact, who had received badges—could fill up Form No. 828, and would then, if the Ministry approved the application, be dealt with at the discretion of the Munitions Area Dilution Officer.

Subsequently it was made clear that such undertakings must apply for certification in order to come under the schedule, and that the washing of gas for benzol and toluol does not in itself qualify an undertaking for certification. As a matter of fact, numbers of undertakings which are not certified or eligible for certification are being dealt with and protected by the Munitions Area Recruiting Officers. The situation, which is rather obscure and difficult, is being carefully watched; and it may be stated that the need for reasonable protection for the gas industry is thoroughly recognized by the Ministry of Munitions and the Local Government Board.

The Executive Committee have urged upon gas managers the necessity for the replacement of male by female employees wherever possible, and a list of the many and varied kinds of work on which this has been found practicable has been published in the Technical Press.

On the occasion of the last deputation to the Reserved Occupations Committee, the Chairman of that Committee expressed his pleasure with the way the gas industry was dealing with this important problem, but stated that there were a number of works at which a good deal more could be done in the direction of employing female labour.

The statistics supplied by gas undertakings in response to the Council's appeal of Nov. 27 last were tabulated and placed before the Reserved Occupations Committee, and have proved of great value in many other negotiations with Government Departments. Thanks are due to those managers of undertakings who, although very much understaffed and having an already sufficient amount of clerical work to do on Government returns, were good enough to supply the information sought.

Labour for Stove and Meter Works.—Assistance has been rendered as far as possible to the stove and meter sections of the Society of British Gas Industries in their efforts to secure the reservation of men essential to the carrying on of repair and maintenance work for the gas industry.

SUPPLY OF PLANT AND MATERIALS.

Stove and Meter Works.—Assistance has also been rendered to those sections in their negotiations with the Priority Branch of the Ministry of Munitions, with a view to securing essential materials. Much difficulty is being, and will be, experienced in obtaining copper and steel.

Gas-Works.—Many gas undertakings are experiencing difficulty in obtaining materials for urgent repairs and extensions of works. Every effort will be made to assist them if full particulars are forwarded to the Secretary. But it has been found that no general representations, unsupported by specific facts, receive any consideration by a department already experiencing the utmost difficulty in adjudicating between specific claims for material of which there is an inadequate supply.

EXCESSIVE NAPHTHALENE STOPPAGES DUE TO THE WASHING OF GAS FOR BENZOL AND TOLUOL.

The Council having been appealed to for assistance to enable gas managers to cope with the increased stoppages caused by naphthalene due to the installation of benzol and toluol recovery plants, referred the matter to the Institution of Gas Engineers, who very promptly prepared and sent to every gas undertaking in the kingdom a pamphlet giving full particulars as to the best methods of dealing with the trouble.

PRICE OF BENZOL AND TOLUOL.

Communications have been received from several gas managers asking the Council to make representations to the Ministry of Munitions with a view to securing an advance in the price paid for benzol and toluol, on account of the increase in the prices of raw material and wages and of other factors over which they have no control. The matter was discussed by the Executive Committee, and negotiations were opened with the Ministry on the subject, but proved unsuccessful.

MARKET FOR BENZOL AFTER THE WAR.

The question of the utilization of benzol after the war is receiving the careful attention of the Executive Committee, with a view to the gas industry obtaining a market for this product as a motor spirit and for other purposes on reasonably remunerative terms.

SPECIFICATION FOR BENZOL FOR MOTOR SPIRIT.

The Executive hope to publish shortly a standard specification for the preparation of benzol for use as a motor spirit. This is essential to the creation of a permanent market.

TAR.

Proposals for Co-operative Distillation by Gas Undertakings.—In October last a proposal was placed before the Council concerning the possibility of gas undertakings combining to erect central tar distilleries in various parts of the country, in order that undertakings which do not possess their own plant might be able to obtain better prices than have been realized in the past by selling their tar to firms of distillers working exclusively for their own profit.

The Council ascertained that schemes had existed in Nottinghamshire where gas undertakings combined and sold their tar at an annual meeting at which managers of all the works were present—thus obtaining a much better price than when selling individually. Owing, however, to the apathy of some of the gas undertakings, the scheme fell through some years ago. In order to ascertain the feeling of the gas industry on the subject, the Executive Committee sent out a circular-letter to all the District Associations, inviting their interest in, and consideration of, the matter. The general feeling expressed in reply was that some better arrangement was desirable, but that the industry was not in a position to decide at once what course would best meet the situation.

Proposals for Profit-Sharing Arrangement with Combination of Tar Distillers.—Meanwhile, the distillers approached the Chairman of the Executive Committee, stating that it was the intention of several distillers to combine, scrap much of their old plant, and invite the gas industry to sell tar to them for which they (the distillers) proposed to pay on a sliding-scale, and declare a bonus to the gas undertakings out of the profits made. Another suggestion was that gas undertakings might become shareholders in the new combination.

The distillers have sent deputations to meet representatives of the gas industry on several occasions, and have submitted the outline of their proposed scheme. This scheme was carefully considered by a Sub-Committee, composed of experts representing the scientific, actuarial, and selling branches, who have now prepared an alternative suggestion, and this has been submitted to the tar distillers for their consideration—without, of course, committing the gas industry to the acceptance of any of its terms.

The Executive Committee are of opinion that if a reasonable and mutually profitable working basis can be secured, it would be desirable from every point of view.

CALORIFIC POWER STANDARD.

Bills and Orders.—On representations by the Executive Committee to the Board of Trade, it was ascertained that the Board would be prepared to grant Orders under the Gas (Standard of Calorific Power) Act, 1916, for the substitution of a calorific standard for the existing illuminating power standard without holding inquiries, even where there was opposition, except in very special circumstances. By this arrangement the heavy expense attendant on being represented professionally at inquiries was overcome, and the smallest undertaking enabled to apply for an Order. The Council were informed that the Sheffield Order could be taken fairly to indicate the lines the Board would follow in other cases.

Testing for Calorific Power.—The simplification of the testing of gas for calorific power was discussed, and the matter has been referred to the Institution of Gas Engineers for consideration by a Special Committee which will be asked to report to the Council.

Minimum Pressure Clause: Revision Period.—A deputation, consisting of the Joint Hon. Secretaries and Mr. T. Goulden, attended a conference at the Board of Trade regarding an application by the Railway Companies for the insertion of a penal minimum pressure of 20-10ths in Orders under the Gas (Standard of Calorific Power) Act, 1916. The Committee are glad to be able to report that the Board decided, "as a general rule and in the absence of exceptional circumstances," to provide in the Orders made by them under the Act that the gas shall be supplied by the undertakers at a minimum pressure of 15-10ths of an inch, and to insert in the Orders a clause in the following form:

> If after the expiration of five years from the date of this Order application is made to the Board of Trade, by the company or by any body or person who may appear to the Board of Trade to have a substantial interest in the matter, to reduce or increase the standard calorific power or the pressure prescribed by this Order, the Board of Trade, after hearing the parties and any other persons who appear to the Board to be interested, may make such reduction or increase of the standard calorific power or of the prescribed pressure, as they think fit.

The Consultative Committee have already thanked Mr. Doig Gibb for his interest and valuable assistance in connection with this matter, and also the members of the Council who formed the deputation.

Proposals for the Limitation of Diluents in Gas.—Opposition was experienced by the Haslemere and Hemel Hempsted Gas Companies to their Bills before Parliament by the railway companies, who demanded the imposition of penalties for over 10 p.ct. of incombustibles present in the gas, and the provision of a minimum pressure of 20-10ths. The matter was brought before the Executive Committee, who are glad to record that the oppositions were withdrawn on the gas companies undertaking to give a minimum pressure of 20-10ths to the railway companies as distinct from the rest of their districts. The whole question of the percentage of incombustible matter permissible or advisable in the gas supplied has received attention, and has been referred to a Special Committee of the Institution of Gas Engineers.

SUGGESTED REVISION OR ABOLITION OF THE SLIDING-SCALE.

The Executive Committee discussed the advisability of seeking the sanction of Parliament in order that the shareholders of gas undertakings working under the sliding-scale might not be penalized owing to the exceptional increase in the price of gas rendered inevitable by war conditions. Inquiries were made as to the reception such an application would be likely to get in official quarters; and the Committee were advised that the present time is inopportune for any such proposition. The situation is being watched, and will be brought up for further discussion when it is thought the time has arrived to secure the consideration desired.

EXCESS PROFITS TAX.

The attention of the Executive Committee was drawn to the fact that electric lighting undertakings had made a successful appeal before the Board of Referees for an increase of the statutory percentage fixed in connection with the excess profits tax. The position of gas undertakings in this respect was carefully considered; and it was ultimately decided that an application on their behalf would be unlikely to meet with any success. The subject is a very complicated one; but the principal reasons for the decision arrived at are that electric lighting companies are working under terminable leases. The terms of compulsory

purchase are very uncertain, and provide nothing for goodwill; and if application were made on behalf of gas undertakings, it would probably be necessary to prove that the excess profits now being made were really deferred profits, owing to capital expended during pre-war years having been hitherto unproductive.

SALE OF GAS ACT—PROPOSED AMENDMENT.

The attention of the Executive Committee has been drawn to the action of the Newcastle-upon-Tyne Corporation in urging the Board of Trade to amend the Sale of Gas Act, 1859. The amendments proposed affect the measuring mechanism of gas-meters; provide for the re-testing and stamping of meters not less frequently than every five years; for the testing at both high and low pressure; for the testing and stamping of indices before being fixed in the meters; and for the standardizing of all inlets and outlets—the size to be dependent upon the capacity of the meter, instead of varying according to the different practices of the manufacturers, as at present. This matter has been referred to the Institution of Gas Engineers, who have referred it to the Committee which is already conducting research upon the life of meters.

AFTER THE WAR PROBLEMS.

Fuel Conservation.—The Executive Committee have considered the effect of the institution of the following:

The Board of Trade Committee on the provision of a cheap supply of electrical power.
The Board of Fuel Research.
The Coal Conservation Committee.

The questions raised cover such a wide field that it was felt that immediate steps should be taken to place before the Government any points upon which the gas industry could offer useful advice or ask for Government co-operation in investigating. The following Committee has, therefore, been appointed in order to think out the various problems as they affect the industry, to discuss proposals for the utilization of gas to the best advantage, and to suggest, if possible, any points where official co-operation can be secured, in order to reduce the consumption of coal and to develop the resources of the country in the national interest: Messrs. J. Ferguson Bell, A. E. Broadberry, Charles Carpenter, Dugald Clerk, T. Goulden, A. A. Johnston, Frank Jones, E. W. L. Nicol, and two members nominated by the Society of British Gas Industries (with power to co-opt other members).

Education.—Communications received from Sir Joseph Bellamy as follows were considered by the Executive Committee, viz.:

(1) As to the promotion of a scheme for organizing original research in chemistry and science on behalf of the industry.
(2) As to the question of education after the war, suggesting the formation of a Government Employment Bureau for the purpose of supplying candidates from the Technical Schools to the various industries throughout the empire in which science (and especially chemistry) or technology are essential, so that the lack of co-operation which now exists may be overcome.

It was suggested to Sir Joseph that it would be advisable to communicate with all the education officers of the various municipalities throughout the Kingdom. The matter was also duly laid before the Scientific and Industrial Research Department of the Board of Education.

PROJECTED ASSOCIATION OF SULPHURIC ACID MANUFACTURERS.

The proposed formation of a National Association of Sulphuric Acid Manufacturers was reported to the Executive Committee, who are watching the matter.

FINANCE.

The Funds of the Council have been supplied by the four constituent bodies, viz.: The Institution of Gas Engineers, the British Commercial Gas Association, the Gas Companies' Protection Association, and the Society of British Gas Industries, who have each subscribed £100. This sum has been sufficient to meet the current expenses to date. An account has been opened with the Capital and Counties Bank.

(Signed) D. MILNE WATSON,
Chairman of Executive Committee.

June 4, 1917.

Unemployment Insurance.—The Umpire has decided that contributions are payable under the National Insurance (Part II.) (Munition Workers) Act, 1916, in respect of workmen employed in the gas department of a city council, and engaged in drilling holes in gas-lamp pillars or in painting lamps in a workshop.

Masonic.—At the regular meeting of the Northern Star Lodge, No. 3053, last Friday week, at the Midland Hotel, Manchester, it was determined to defer to the next meeting of the Lodge, in August, the presentations to be made to three members who had rendered eminent services for several years—viz., to Bro. J. W. Scott, of a Past Charity Representative jewel; to W. Bro. R. G. Shadbolt, of a Past Secretary's jewel and a clock; and to Bro. E. O. Watson, of a fitted travelling suit case, for his work as Assistant Secretary.

INSTITUTION OF GAS ENGINEERS.

AGENDA FOR THE ANNUAL MEETING.

THERE will be morning and afternoon sittings at the annual general meeting of the Institution, which is being held to day at the Institution of Civil Engineers, Great George Street, S.W.—under the presidency of Mr. A. E. BROADBERRY, M.Inst.C.E., of Tottenham.

Morning Sitting, at 10.30 a.m.

After the presentation of the minutes of the last meeting and the appointment of Scrutineers for the ballot lists (whose report will be presented at a convenient period during the proceedings), the President will deliver his address, and there will be brought forward the recommendations of the Council in regard to the proposed building. An alteration in the Articles of Association will be proposed, and the Council's report and the statement of accounts will be submitted.

The report of the Refractory Materials Research Committee will be presented by the Chairman (Dr. Harold G. Colman); and that of the Gas Lighting, Heating, and Ventilation Research Committee, by Prof. John W. Cobb (Livesey Professor of Coal Gas and Fuel Industries, University of Leeds).

The morning session will conclude with the annual general meeting of the Benevolent Fund.

Afternoon Sitting, at 3 p.m.

In the afternoon, the President will present the report of the Life of Gas-Meters Joint Research Committee.

There will also be the election of honorary members, the determination of the place of next meeting, and the votes of thanks.

Visit to the Tottenham Gas-Works.

To-morrow (Wednesday) the members will visit the works of the Tottenham District Light, Heat, and Power Company, by the kind invitation of the Chairman (the Rt. Hon. Sir D. Ford Goddard, M.P.), and Directors of the Company, to inspect the new section for the manufacture of 4¾ million cubic feet of gas per day. In the afternoon, those desirous of doing so, will be able to inspect the Company's electricity works at Wood Green.

The Commercial Sections.

We are asked by Mr. S. Meunier (the Convener) and Mr. H. Kendrick (the Hon. Secretary) to notify the members of the Commercial Sections of the country that the general meeting which had been announced for Thursday, at No. 39, Victoria Street, will not now be held, arrangements having been made for the matter which was to have been raised to be discussed with the National Gas Council earlier in the week.

THE PATENT OFFICE REPORT.

THOUGH far below that of any recent pre-war year, there was some improvement, as compared with 1915, in the business carried out through the Patent Office in the past twelve months, as revealed by the report, issued a few days ago, of Mr. W. Temple Franks, the Comptroller-General of Patents, Designs, and Trade Marks. It is the thirty-fourth report of the series, and covers the twelve months to Dec. 31, 1916.

Proceedings under emergency legislation are first of all dealt with; it being stated that there were during the year 96 applications under the Patents, &c., Temporary Acts and Rules, for the avoidance or suspension of patent rights. In 56 cases the licences have been, or will be, granted, and in three the patents have been suspended in favour of the applicants. In nearly all of the remaining cases the applications have been withdrawn or abandoned, or no decision has yet been given. There were seventeen applications made for the vesting in the Custodian of the benefit of applications for patents made by, or on behalf of, enemy subjects, and for the grant of licences; and in the cases decided, except one which was abandoned, the applications have been vested in the Custodian and licences have been granted.

Patentees will remember that at the beginning of the war arguments were made by which specifications and documents relating to foreign patents, &c., could be deposited in the English Patent Office, "at the depositor's risk, and without any guarantee that this procedure would be recognized by the foreign Patent Office, for the purpose of recording the intention on the part of the depositor either to do some act or to file some document on a certain date at a foreign Patent Office with which communication was difficult or impossible owing to the war." The number of notifications deposited under these arrangements during the year was 290.

With regard to the ordinary work of the Patent Office in 1916, it is seen that the total number of applications for patents (18,602) exhibits an increase of 411 in comparison with the previous year, when, however, there was a falling off of nearly 7000 from the figure for 1914. The total for 1915, in fact, was the lowest number received in any year since 1887; and 1916 is not a very great improvement on it. The applications accompanied by provisional specifications increased from 13,242 to 13,641; and those accompanied by complete specifications, from 4949 to 4961. Thus

the proportion of applications accompanied by complete specifications was only 27 p.ct. of the total number of applications. A falling-off is recorded in the already small number of applications received from women inventors; the number being 238, as compared with 268 in 1915. Existing difficulties have entailed still further decreases, too, in the applications made by way of communication from abroad—from 948 to 835; while under the provisions of the International Convention for the Protection of Industrial Property 1400 applications were made in this country, as compared with 1555 in 1915. For 1914, the figures were respectively 1291 and 2909.

Attention is drawn to the fact that at the beginning of the year the practice was introduced of giving new numbers to applications for patents when their complete specifications were accepted or became open to public inspection before acceptance. To avoid confusion with the original application numbers, the new series commenced with No. 100,001. The main advantage of this system, it is pointed out, is that it enables abridgments of specifications to be published to date without destroying their numerical sequence, and thereby gives the most recent information to the public without impairing the facilities for search and reference.

There are now six patents in force which have been prolonged beyond the normal period of fourteen years; three having been added during 1916—one with an extension for three years, another for seven years, and the third also for seven years, but not to exceed five years from the termination of the war. There were 42 applications made for the restoration of patents which had lapsed owing to the non-payment of renewal fees.

The receipts from patent fees, &c., last year amounted to £268,140, as compared with £256,723 in 1915. The renewal fees totalled £198,981, which was an increase of £15,052 compared with the preceding year, and the largest sum received in any one year. The sealing fees, on the other hand, fell from £12,837 to £8805.

THE PROGRESS OF APPLIED CHEMISTRY.

THE labours of the technical chemist are nowadays considerably lessened, as far as literature can do so, by the yearly reports of the Chemical Society, Hendrickson's "Gas Chemists' Summary," and the latest addition to the number issued by the Society of Chemical Industry, and bearing the title heading this notice.* It is our pleasure here to introduce this latter volume to our readers. The book is divided into sections treating of fuel (30 pages), gas and tar products (30 pages), mineral oils, acids, &c., dyes, ceramics, building materials, oils, paints, indiarubber, glue, fermentation, water purification, fine chemicals, and photographic materials. Two of the authors at least have names well known in the gas profession—namely, Cobb and Evans; and as we gather from the preface, the present report is the materialization of a suggestion by the latter gentleman.

The whole get-up of the book is admirable, and each section gives a clear and precise *résumé* of the scientific results obtained (as far as available) during 1916. Further, the articles are very readable.

As the report is to be issued annually, every chemist and student—gas or otherwise—will find that he must get a copy, as the work as a whole is of those things that make one wonder how it has been possible to have managed so long without them.

Besides the ordinary scientific material, patent literature is also discussed; and, with regard to the Evans process for the conversion of sulphocyanides into ammonia, by treating ammonium sulphocyanide solution with hot sulphuric acid, it would be interesting to have practical working results if any are available.

Attention may also be directed to some laboratory experiments quoted by Prof. J. W. Cobb, on the mixing of nitre-cake with sulphuric acid in the manufacture of sulphate of ammonia. The crystals obtained on partial evaporation, and filtered hot, had the composition given (dry):

Nitre Cake, per Cent.

—	2½	5	10	15
Ammonia	25·24	24·51	21·76	19·89
Ammonium sulphate	98·02	95·17	84·08	77·22
Sodium sulphate . .	0·81	3·51	14·04	20·82
Free acid	0·87	1·20	0·80	0·75

The figures show, as the Professor points out, that the proposed substitution of nitre cake for acid can only be made in quantity at substantial expense of the purity of the ammonium sulphate, to which the reviewer would add a further remark on the unsatisfactory condition of the mixture, which never appears dry, and the harmful effect on the bags of the free acid present.

It would be a good thing for the readers of these various separate reports if the whole information could be published in one volume, so that overlapping, which must and does of necessity occur, could be avoided, and the whole range of both pure and applied chemistry be found between the same covers.

* "Reports of the Progress of Applied Chemistry, Issued by the Society of Chemical Industry." London: Harrison and Sons; 1917.

ELECTRICITY SUPPLY MEMORANDA.

THE members of the Board of Trade Committee on Electric Power Supply must begin to feel that they are not likely to please anyone but themselves, and possibly the Board of Trade.

Ridicule and the Power Supply Committee.

Their composition has been the subject of round abuse, the echo of which has been heard in the House of Commons and the criticism is still being continued by local authorities backed by the section of the Electrical Press which is always pleased to have a fresh football to kick. Even the little pronouncement by the Committee (referred to in our editorial columns last week) as to what broadly is wanted by the industries in respect of electric power, the insufficiency standing alone of the linking-up of electric undertakings, and the need of a comprehensive system of generation and reorganization of electric supply, has been met with mild derision, as the statement of belief is merely a reiteration of some previously conceived and generally held opinions. But it required "several meetings" of the Committee, and solemn deliberation, to arrive at the already accepted conclusions. The Committee must have found the work somewhat exhausting. "Meteor" of the "Electrical Times" finds the conclusions five harmless platitudes; and "harmless platitudes" are interpreted by him to mean "obvious truths." We have in the course of the part of our career which has been devoted to a little controversy with certain contemporaries come into contact with "harmless platitudes" that were deliberate falsehoods. At one time this particular species grew luxuriantly in certain quarters. But "Meteor" is right in his interpretation on this occasion. The early pronouncement our friend thinks betrays some anxiety on the part of the Board of Trade; and he believes the nervousness is well justified, for the Board sought to apply Potsdam methods to the objectors, and tried to ride them down. But possibly they are beginning to realize the strength of the movement.

Split Views.

When we unite a decision of the Committee with a reply given in the House of Commons about the same time, it seems that there may be a smack of truth in this last suggestion of "Meteor." It will be remembered that the West Ham Borough Council took the lead in objecting to the Committee on the ground of inadequate representation on it of local authority interests; and they have secured a small following from other local authorities who have passed resolutions agreeing with this view. The Committee in their pronouncement of belief stated their intention to invite representative Associations before them to give evidence. In the House the inadequacy of representation was contested by Mr. Roberts, the Parliamentary Secretary to the Board of Trade. Apart, he said, from the member on the Committee representative of local authorities, another member of the Committee is consulting engineer to many local authorities owning electric undertakings; and he, as well as the representatives of the Local Government Board and of the London County Council, may be regarded as interested in the local authority aspect of the electric supply industry. Mr. Roberts added that the Committee propose to take evidence from various local authority associations, who will thus have ample opportunity of stating their views. Consequently, the Board does not think there is any occasion to place more members on the Committee. The statement so far as the Board is concerned appears to be determinate. But if the electric supply industry generally does not think the Committee a sufficiently competent tribunal, there is not the slightest obligation upon any of its associations or technical men to respond to the invitation to give evidence; and this would bring about either a fiasco or a reconstruction of the Committee in fully representative form. It is a case where fidelity to the interests of the industry may be better served by abstention from than by giving evidence. The Hammersmith Borough Council have gone farther than the other protesting local authorities. They demand that the Board of Trade Committee should be dissolved, and a new Committee—consisting of a small number of competent unbiassed persons not directly interested in electric matters—should be constituted in lieu thereof, inasmuch as it is felt that the addition of one or two municipal representatives to the Committee as at present constituted would by no means meet the situation. On the other hand, we have the "Electrician" commending the promptitude of the Committee in issuing its conclusions, "some of which are sufficiently obvious." Those which are not are not named by our contemporary. The Electrical Correspondent of "The Times Engineering Supplement," who is strong on London getting "more of its power and heat [expensively] by wire instead of by cart," finds satisfaction in being able to deduce from the preliminary "conclusions" of the Committee that it is not going to waste weeks and months in again receiving masses of technical evidence from a procession of eminent experts to prove what has been proved over and over again—that the economics of electrical supply should not be confounded by parochial politics. He also thinks that, if the Committee succeeds in getting the principles it enunciates carried out in practice, it will certainly justify its existence. But will it? What other people are afraid of is that, with a Committee so constituted, there will be a great waste of time, and no really advantageous result. But while there is all this vigorous expression of discontent and less vigorous expression

of approval, nothing is heard from the electric supply companies. Perhaps they have preferred to adopt subterranean channels for making some protest, or, on the other hand, they may be satisfied, If so, as things go electrically, they must be very happy.

Radiant Elements and Convenience on the Hot-Plate.

In last week's "Memoranda," subjects connected with electric cooking were commented upon. In other articles, some account was given of the large new gas-range, with external heating, at the Union Club, Trafalgar Square, and of the equipment in the model "communal kitchen" in Westminster Bridge Road. The gas-range at the Union Club brings into prominence a point which the makers of electric-ranges will find it difficult to negotiate. The 3420 B.Th.U. of the electrical unit does not allow of any waste of heat in cooking; but if a cheaper heating medium than electricity is available, and some amount of heat waste will promote convenience and economy in the work of the kitchen, then the waste is legitimate—at all events, that is the opinion of experienced chefs in places where demands are large and time is a consideration. The top of the "Langham-Central" range is a plane surface with circular and square panels which can be removed in order to get direct contact of flame, while conduction of heat along the plane surface supplies temperature at all parts of it, so that vessels can be slipped about at will, and high, moderate, medium, or low, and any intervening, temperature can be communicated to the food in the utensils. The whole of the spacious hot-plate is a working surface; and the convenience of this is in the eyes of the chef a merit that cannot be surpassed, seeing that more work is done on the hot-plate than in the ovens themselves. Now experience proves that, with the latest electric elements—those of the radiant type—this advantage cannot be secured without very high cost. With them, the heating is purely local, and the convenience is limited; and in these days of great expense and labour shortage (to say nothing of the importance of saving space and time in kitchens where busy hours are passed at high tension), the limitation of convenience cannot be tolerated.

Sources of Worry and Inconvenience.

Though the traders in electricity as well as makers of electric-cookers are naturally profoundly desirous of doing bigger business in these promoters of trouble in the household, they do not seem to be able to arrive at any agreed structural standards. There is the question of fuses. Cheapness rather than the protection of the convenience of the users of the cookers seems to control the makers in this matter. The point was recently discussed by the "Electrical Times" as to whether an electric-cooker should be controlled by a single fuse on the supply leads or by a separate fuse on each of the circuits. Our contemporary is sorry to see that there is a decided tendency in some quarters to fuse a cooker merely on the main leads—the defence for this arrangement being that a fuse on each circuit involves complicated wiring, and is undesirable because the fuses, if placed on the cooker, are exposed to great heat from the range itself. Our contemporary asks whether in practice there is any real objection to the plan, but its own preference is for a wall panel, equipped with fuses, indicators, and rotary switches for every circuit. Of course, with it there can be no risk of overheating, of mechanical damage, or of trouble from spilled liquids and grease. At the same time, it is acknowledged that, "with careful design," it is possible to mount switches and fuses on the cooker itself in such a manner that they will be protected against overheating, mechanical injury, and electrical troubles. But the independent system, though more expensive, is the safer one. It is all a question of cost. "Any small gain in first cost by omitting circuit fuses is very dearly purchased by subsequent annoyance to the user. If a main fuse blows, it tends to create alarm; but of greater moment is the fact that it puts the whole range out of commission. With separately fused elements, the failure of any one unit through a burn-out, accidental contact, or other cause merely blows a light local fuse, and none of the remaining circuits is interfered with, so that cooking can be continued." Whether it can be efficiently continued depends upon circumstances. The writer fears that the demand for cheaper cookers may force the hands of the manufacturers, and compel them to omit local fuses. But "it is sincerely to be hoped that the advocates of 'one cooker one fuse' will realize the danger of this policy, and recognize that 'one circuit one fuse' is the only safe and sensible system upon which electric ranges should be designed." What a number of seats of trouble there are in the electric-cooker! The cheapness and reliability, as well as the quick boiling capacity, of the gas-cooker and hot-plate are far and away preferable to introducing additional worry and inconvenience into the honsehold.

The 100 P.Ct. Fallacy.

In the allusions to electric cooking last week, mention was made of an article on the subject that had appeared in "The Times Engineering Supplement." In that article, the writer also referred to electric heating; and he linked himself up with those adherents to the fallacy that "with all electric-heaters, since there is no flue, the efficiency is always 100 p.ct.—the whole energy absorbed is given out in useful heat." In an article in the "Electrical Review," Mr. G. W. Stubbings points out that, in respect of statements of the kind, it should be noted that, although it is declared that all the electrical energy is converted into heat, no mention is made of temperature. He holds that "the practical efficiency of an electric-fire has very little to do with its thermal efficiency, and that the statement that all electric heaters have 100 p.ct. efficiency is irrelevant." He supplies some elementary facts in support. A person, he says, can be warmed in two ways. First, by contact with a hot body, and, secondly, by the absorption of radiant energy. The first method is obviously unsuitable to the human person, except by contact with warm air, when the process will be slow, unless the temperature of the air be fairly high. To maintain a high-air temperature in an ordinary room in which proper provision is made for ventilation would be a very costly matter by electrical means. The second method is independent of the temperature of the air, as radiant energy can pass freely through air without appreciably raising its temperature, and the process can be made as rapid as desired by increasing the absorption. The time element enters into the consideration of what constitutes the practical efficiency of an electric-fire; and such efficiency could be roughly described as depending upon the time taken for a person coming thoroughly chilled from a cold atmosphere, to get comfortably warm by standing at a given distance from the fire. It is true an electric-fire with exposed elements is preferable to the old-fashioned lamp radiator, which had an appreciable proportion of its radiation absorbed in the glass of the lamps, and converted into heat. A thoroughly efficacious radiator should, moreover, be as light as possible; for a bulky device, which is maintained at a moderately high temperature, is partly a convector, and therefore loses in practical efficiency. In fine, it should be remembered that all the electrical energy that reappears directly as heat at a fairly low temperature is not usefully employed, as such heat can only be communicated to cold persons by convection and contact.

"Lest We Forget."

In the subterranean depths of the Highgate and Hampstead tube on Bank Holiday, some amount of excitement among women and children holiday makers was caused. That is how the newspaper report puts it; but we have not the slightest doubt there were men among them who also experienced a little quaking. Fortunately, the trouble occurred at the Camden Town Station, and not in a part of the tube where there are no means of escape, or the results might not have been confined to excitement. It was on a six-coach train, carrying from 350 to 400 passengers that the motor beneath the rear carriage caught fire. There was a pungent smell of burning rubber, and a bluish vapour filled the carriages. As soon as the train was brought to a standstill, there was a rush for the gates; and but for the presence of mind of the girl conductors, the crush would probably have developed into something serious. "Traffic was delayed for an hour," which is a statement that tells more than the one that sand thrown upon the burning motor "speedily quelled" the flames.

PRODUCTION OF LIQUID AMMONIA.

[From a Dutch Correspondent.]

UNTIL the beginning of the great war, Holland was dependent for its supply of liquid ammonia upon England, Germany, and more particularly Belgium. At the commencement of 1915, no liquid ammonia was to be had in Holland, as not only the ammonia itself, but also the steel cylinders for containing it, had been commandeered in the belligerent countries, or declared contraband of war. This caused much trouble to the industries making use of low temperatures. Calculation showed that the total annual consumption of Holland would amount to something like 27,000 kilogrammes. At the Arnheim Gas-Works, all the ammoniacal liquor produced was generally converted into pure concentrated ammonia solution; but during the war the high prices of sulphate, and the national need for artificial fertilizers, led to part of the ammonia being sent out as sulphate.

The ammonia as driven off is saturated with water; but it is important now to obtain it as dry as possible, to ensure the safe working of refrigerating machines. The restrictions in this connection are, therefore, of increasing severity. Whereas some twenty years ago 0·9 to 1 p.ct. of water was permitted in liquefied ammonia, the maximum allowed has since been lowered to 0·4 or 0·5 p.ct. The drying properties of chloride of lime cannot be made use of, as it combines with ammonia. Caustic soda, too, is valuable in these days; and so there remains only as an available drying agent burnt lime. This, however, has an insufficient drying effect, except under pressure. With the pressure at normal, the lime generally left 0·9 to 1 p.ct. of water in the gas. The most effective means of producing totally anhydrous ammonia (with 0·05 p.ct. of water) is by evaporating the liquefied ammonia, and subsequent re-liquefying of this volatilized first product.

At the Arnheim Gas-Works efforts have been made to eliminate the greater part of the water by cooling. To the current of wet ammonia gas, there is added liquefied ammonia at a regular temperature. By the evaporation of the liquefied gas, the temperature falls as low as 15° C. Thus the water is condensed, after which the gas is led through the drying apparatus. The condensed water is, of course, saturated with ammonia, and leaves the compression plant through a syphon. The amount of liquid ammonia (about 7 p. ct. of the total bulk produced) is naturally not lost, as it is liquefied again. It is taken from cylinders and

not from the general storage holder, to permit of control of the quantity used.

After this treatment, the gas passes through two towers filled with lumps of burnt lime; the inlet being at the upper side, the outlet at the under side. Provision is made for the subsequent treatment of the gas with caustic soda lumps in a separate tower, After these processes, the gas passes to a large storage holder, from which it goes to compressing plant very similar to that in use for ice manufacture, except that there is no brass, and the compression cylinder stands in circulating cooling water.

Mineral oil is used for lubricating; an oil-separator being placed after the compressor for removing the surplus oil. In spite of this cooling, the ammonia gas, when compressed at from 7 to 10 atmospheres, becomes warm. It is condensed in a large cooling coil, and then collected in a storage receiver of about 70 gallons capacity, from which it is emptied into the steel bottles. On the pressure side of the compressor, and above the cooling coil, there is a blow-off tap. The permanent gases, and more especially the air, which accompany the ammoniacal gas from the stills are blown off during the working, and conducted through water for the retention of the ammonia.

From the storage receiver the ammonia is charged into steel bottles, after these have all been emptied by a small pump operated by the gas-engine which drives the compressor. The chemical and physical properties of gaseous and liquefied ammonia are well known; but one peculiarity may be referred to—viz., the high expansion co-efficient of the liquid. At ordinary temperatures, this expansion is less marked; but at slightly raised temperatures, the increase becomes very considerable.

At 10·0° C.,	the pressure is	88·2	lbs.	per	square	inch.
50·0° C.	,,	294·0	,,	,,	,,	
63·7° C.	,,	455·7	,,	,,	,,	
67·7° C.	,,	860·0	,,	,,	,,	

Thus for a rise in temperature of only 2° C., the pressure is almost doubled. The filling of the bottles therefore needs special care; for when the expansion is not taken into account, an explosion of the bottle is to be feared.

The delivery of liquid ammonia during the first year amounted to 40,000 kilogrammes.

GAS AS A FACTOR IN NATIONAL ECONOMY.

By Thos. Newton.

The efforts and energies of the nation are now being organized, co-ordinated, and directed into what are considered to be the best channels for securing the maximum economic result in the national interest; and anything, therefore, which tends towards national economy is welcomed.

Industrial Efficiency Promoted by the Use of Gas.

In all the changes that have taken place, it is satisfactory to know that gas has played an important part; and the fact that gas is an admitted factor in national economy implies that it is also a factor in national efficiency. True economy and efficiency are inseparable.

The whole story of what gas has done for the metal trades will probably not be revealed until after the war; but one may rest assured that it has gained for itself a conspicuous position in the metal industries throughout the country. Almost all our industries have been laid under tribute to gas, either directly or indirectly—more particularly directly in the various spheres of industrial activity, though its indirect use is none the less beneficial. Indeed, the influence which the indirect use of gas exerts on industrial efficiency cannot very well be exaggerated.

Gas the Labour Saver.

The excellent types of gas apparatus which have been provided for the welfare of factory workers have contributed in no small measure to the accelerated output of production; but a saving of labour has also been effected in the homes of the workers by the use of gas for various purposes, which has rendered possible the co-operation of women to an unprecedented extent in the industrial sphere. It is a fact that the domestic use of gas in the homes of the workers and elsewhere has indirectly been responsible for much of the increased national industrial output, simply through the saving of domestic labour which is rendered possible. Gas-cookers and gas-fires are nowadays reckoned to be in the very forefront of labour-saving inventions; and certainly they are proving "very present helps in time of trouble." Housewives are daily becoming convinced that the great objection to the use of crude solid fuel is the intensified struggle against dust and dirt engendered by it, which is entirely obviated by the use of gas for cooking and heating.

Conserving the National Effort.

A little consideration will reveal the fact that the national effort is in danger of being somewhat dissipated by the use of crude coal; and this should not be lost sight of when dealing with questions of national economy. In other words, the distribution of gas simply means the scientific distribution of light, heat, and power; and any unscientific distribution of these forms of energy cannot, in the nature of things, conduce to the conservation of the national effort. The waste of effort involved in the distribution of individual supplies of coal is appalling—especially when it is remembered that the organization is already at hand to deal with such supplies in a scientific manner. By using gas for more industrial processes than was formerly the case, a direct saving of labour, inseparable from the cartage and use of coal, has been already effected; and to this extent the national effort has been conserved.

Adequate Coal Supplies Essential.

It will readily be understood that an essential industry like the gas industry must have adequate supplies of its raw material, coal, in order to maintain, and if possible extend, its sphere of usefulness. To restrict supplies, at the present juncture, is something akin to a stultification of the national endeavour. Not only would inadequate supplies adversely affect the nation's highest interests, but the strenuous efforts of whole industries and communities would be thwarted as a direct consequence. It is therefore to be hoped that the Coal Controller will co-operate to the fullest possible extent with an industry which is rendering such signal service of national importance.

BYE-PRODUCT COKE AND COKING OPERATIONS.

An abstract appears in the "Journal of the Society of Chemical Industry" for May 15 of a long article (extending to forty pages) by Messrs. C. J. Ramsbury and F. W. Sperr, jun., in No. 183 of the "Journal of the Franklin Institute."

The abstractor, "T. E. C.," points out that recent development in the building of bye-product ovens in the United States and Canada has been remarkable; and it is estimated that some 9900 ovens will be in operation by January of next year. The development is not altogether due to inflated war prices of bye-products, but to financial conditions favouring large investments. In addition to the economic advantages from the recovery of bye-products, attention is drawn to the conservation of the coal supply brought about by the introduction of modern methods. As far as fuel values are concerned, from a total of 1·4 to 1·5 tons of coal required to make 1 ton of coke, the bye-products lost in the bee-hive coking process have a heat value of 625 lbs. of coal; while an additional 200 lbs. is wasted by the combustion of a portion of the charge.

The advantages of silica material in the erection of coke-ovens are stated thus: The conductivity at high temperatures is superior to that of fire-clay material; the softening temperature is higher; the action under heat may be more accurately calculated, owing to constant composition; the expansion and contraction between 2000° and 2600° Fahr. (1090° and 1430° C.) is negligible. The use of silica material has brought about a shortening of the coking period and a more extensive use of coals richer in volatile matter, with increased yields of bye-products.

The authors notice the effect of variations in the dimensions of a coke-oven—a reduction in width giving the following advantages: Less sponge in the coke; better coke from the same coal; good coke from mixtures with a higher content of volatile matter; higher yields of tar, ammonia, and benzol; lower temperatures for the same coking velocity.

Referring to benzol, the authors emphasize the value of this product as a motor fuel, alone or mixed with alcohol or gasoline.

A brief account of the accepted theory of the coking process is then given. The process is conceived as involving the formation of a fused zone, and the gradual advance of this zone towards the centre of the oven—the evolved gases and vapours depositing part of their carbon in the vesicular mass left as the zone progresses. The actual thickness of this zone is probably not over ½ inch; the drop of temperature across it is very great; and the interior of the oven remains comparatively cool for a considerable part of the coking process. The average rate of advance of the zone towards the centre, with ovens 18 inches wide and a wall temperature of 1000° C., is about ½ inch per hour; the initial rate being more rapid, but decreasing as the centre of the oven is approached. Coke adjacent to the wall is distinguished by its cauliflower-like appearance, and dense layers of deposited carbon. Towards the centre of the oven, the coke is more open and occasionally spongy. As a rule coke from coals with over 30 p.ct. of volatile matter is of a "fingery" type; but by careful regulation of the heat treatment, firm "blocky" coke may be produced from such coals.

For any accurate comparison of cell structure, the authors prefer to make longitudinal sections with a thin emery wheel—thus eliminating the danger of confusing sections made at different distances from the oven wall. These sections are compared with standards cut from blocks of typically different cokes. Numerous illustrations of standards and sections are given. The authors quote the verdicts of various observers on the exact function of coke in the most efficient and economical reduction of iron ore. As furnace conditions are better understood, the range of quality of the coke used may be extended; but the importance of uniformity for any particular furnace cannot be too strongly emphasized. For each kind of coke there is evidently some limiting size for efficient service—*i.e.*, just large enough to offer a minimum surface of attack for carbon dioxide and small enough to ensure complete combustion in a minimum of time at the tuyères. The harder grades of coke should be used in smaller sizes; coke of open-cell structure requiring less attention in this respect.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Proceedings at the Quarterly Meeting (continued).

WHEN giving, on pp. 387-8 of last week's "JOURNAL," the first portion of the proceedings at the meeting the previous Friday of the Institution, it was explained that, owing to the non-receipt of the remainder of the "copy," and our earlier going to press in consequence of the holidays, it was impossible then to complete the report. We are now able to do this—following on after the speeches of Mr. Meunier and Mr. Samuel Glover, on labour difficulties and coal problems.

MR. THOMAS GLOVER'S ADJURATIONS.

Mr. THOMAS GLOVER said it was always inspiring to hear a man of faith. There were people, of course, who were pessimistic, and needed to be helped over a bad attack of pessimism; and at times like the present it was good to come into contact with men of optimism. He sincerely hoped that the last speaker's optimism would be realized. He went on to remark that there was still a good deal to be said on the subject. Recent paragraphs in the Daily Press had, doubtless, caused a great deal of disturbance through the mistaken views set forth in their columns on coal-supply questions. He assured them that the authorities in Government circles realized what the gas undertakings were doing for the country; and they were going to take up the question of coal supplies to its fullest extent. The Coal Controller's Department was in close touch with the Ministry of Munitions; and it was now arranged that one department should not publish paragraphs in the newspapers without submitting them to the other departments. This, he thought, would obviate wrong paragraphs appearing in the newspapers.

THE COAL POSITION.

Regarding the coal position, this was one which was, and is still, causing a considerable amount of concern, as to whether essential industries would get sufficient supplies. This was one of the reasons why the Coal Controller had now got on his staff a large body of experts in the transport and use of fuel. The statistics of production were carefully put alongside the statistics of delivery; and it had been found that there was a good deal of unnecessary transport. This had to be stopped; and this was the reason why the Coal Controller's Department was considering schemes of re-allocation. One of his duties was to inquire why there was so much "crossing" of coal—Yorkshire coal taken to Cardiff, Durham coal taken to Plymouth, and so on. For instance, while East Lancashire would not, it was anticipated, be seriously interfered with, on the question of re-allocation, why should not more East Lancashire coal be sent to West Lancashire and so save the long haulage from Yorkshire? He was sure they would appreciate the necessity for saving haulage, even if they did not, at the moment, see the remedy. The returns had revealed that, although Lancashire was a gas-coal producing county, a great deal of Yorkshire coal was being delivered to the coast towns of Lancashire; and this was one of the points he invited them to seriously take into consideration. It was, moreover, one of the important subjects which the Controller's Department would have to take up with engineers. Had he indicated then, that it was their national and bounden duty to save haulage as much as they possibly could? He counselled them that, if they had any contracts in view, they should endeavour to secure their coal supplies nearer home; for by so doing they would be less likely to have their contracts interfered with by the Controller.

BLUE WATER GAS.

As to the question of making blue water gas, many of them were familiar with carburetted water gas. Blue water gas was only the same minus the oil. Blue water gas was serving a very useful purpose. It did not have more than 6 p.ct. carbon dioxide and very little nitrogen—nothing like the percentage of incombustibles accidentally present in some coal gas. If they had a carburetted water-gas plant standing idle, it could be used to save coal by working blue water gas. If, however, they had the oil, by all means use it to make carburetted gas; but, if not, make blue water gas. Oil, however, was so dear and scarce that few undertakings could just now afford it. Under the trying conditions which prevailed at the present time—war conditions—they were allowed a great deal of liberty. Liberty, however, should not be used as licence. At the same time they should employ their liberty of action to the fullest extent necessary, if the necessity existed. It was, he reiterated, a national necessity that no more coal shou'd be taken over the railways than was absolutely necessary to maintain an adequate supply of gas to their consumers. With regard to Mr. Meunier's subject, he would certainly have less tar; but the amount of explosives available from the tar would be as nothing compared with what was being obtained by oil-washing. Mr. Meunier complained that he had had to use about 5500 tons of coke; but by so doing he had saved the transport of 27,000 tons of coal. This, the speaker thought, was more of a national blessing than a disaster. He had been asked to give his personal experiences of blue water gas making at Norwich. He added 25 p.ct. of blue gas. His coal gas make was 11,000 c.ft. per ton. He oil-washed his gas, and his mixed gas was supplied to the town at 500 B.Th.U. There were no complaints of naphthalene stoppages. Did not that appeal to them? His cost of coal gas into the holder was high. If he could reduce it, it was desirable to do so; and he did in this way. His water gas probably cost him 7d. per 1000 c.ft. into the holder, while the coal gas cost more nearly 1s. 8d. Blue water-gas making would, he thought, save labour; and the Coal Controller fully approved of his campaign. Mr. Glover concluded by stating that his final advice to the members was to at once start adding water gas if it was possible for them to make it. Start, he said, with 5 p.ct., then get to 10 p.ct, and work up to 20 p.ct. by gradual stages.

THE LIST OF PROTECTED OCCUPATIONS.

Other speeches followed; but as confidential matters were discussed, these are not reported. It may, however, be stated that the suggestion from the Wales and Monmouthshire District Institution of Gas Engineers, that the Manchester Institution should pass a similar resolution to the one agreed to by them at the meeting at Merthyr Tydfil on May 16, was unanimously adopted. The resolution was in the following terms:

> That the attention of the National Gas Council be drawn to the fact that in the Schedule of Protected Occupations just issued only those gas undertakings that are "certified" have any protection for their men, who are necessary to carry on the manufacture and distribution of gas.
>
> Nearly the whole of the gas undertakings in England and Wales are either oil or tar washing their gas at considerable expense, to produce as much material required for high explosives as possible; and this meeting of the members of the Wales and Monmouthshire District Institution of Gas Engineers and Managers is unanimously of the opinion that the same protection should be given to the men employed in all gas-works, whether "certified" or not, and therefore calls upon the National Gas Council to take the necessary steps to obtain the inclusion of all gas undertakings in the schedule.

The usual votes of thanks concluded the proceedings.

YORKSHIRE JUNIOR GAS ASSOCIATION.

Visit to the Works of R. Dempster & Sons, Ltd., Elland.

The members of the Yorkshire Junior Gas Association last Saturday afternoon paid a visit to the works at Elland of Messrs. Robert Dempster & Sons, Ltd. A large party, under the presidency of Mr. J. E. LISTER COOPER, spent a most interesting and instructive couple of hours in viewing an undertaking which has undergone vast alterations and improvements since the occasion of the previous visit of the Association some years ago.

The visitors were received by Mr. J. W. Broadhead, the Managing Director, and several members of the directorate and staff. Mr. Broadhead voiced the pleasure of the firm to have the Association once again as guests, and hoped the party would see much of interest in the modernization of the plant and works. There had been great changes since their previous visit, and he hoped that, for some time at least, they had finished with extensions. The works had been brought thoroughly up-to-date in every department.

In a tour of the works the party were under the guidance of Mr. Broadhead, Mr. E. J. King, Mr. H. J. Toogood, Mr. W. H. Hanley (Works Manager), Mr. A. Barnes (Head of the Telpher and Conveyor Section), and Mr. J. E. Horsfall (Chief Draughtsman). It was seen that the principal alteration had been the erection of the new constructional steel department. The old department, now largely demolished, had consisted of a rather low place which did not lend itself to the full advantages of overhead cranes. Extensions on the old lines had been made until things became so congested as to make drastic alteration necessary. Plans for the new shop had been maturing about the time of the outbreak of the war, but were held up owing to the grave uncertainties of that time. The battle of the Marne, the first glimmering of indication of ultimate success to our arms, caused Messrs. Dempster, with a bold outlook to the future, to take their courage in both hands and proceed with the scheme. The plans were completed, and the new constructional shop was built over the major portion of the old shop. A notable feature of the work was that it was carried through without disturbance of the activities proceeding in the old shop until the new place was completed. The visitors were able to recognize the magnitude of this work by noting the remains of the old low and lengthy building, extending beyond the more square formation of the newer shop, and still in commission, so far as their natural limitations permit.

The new shop consists of three bays of 65 ft. span, 250 ft. in length; and annexed to it is a portion of the old shop—the most modern part a shed measuring 150 ft. × 100 ft., with an overhead template floor 150 ft. long and 40 ft. wide. The whole of the work turned out in the structural steel department is first put down on the floor full size, and the work afterwards made from templates reproduced from the full-size floor drawing. The height from the floor lines to the rails is 40 ft. Each bay is fitted with electric overhead cranes, thus enabling the largest structures the firm are likely to deal with to be made and erected in the shop—a great gain in efficiency and economy in manufacture. The shop is complete with all modern machines which one would expect to find in such a department, particularly so in the latest "Asquith" drilling machines for drilling batches of plates, plate edge planing machines, hydraulic presses, oxy-acetylene cutting and welding plant, &c. A very pleasing feature of the new shop, and one much admired by the visitors, is the roof, which

is of a light character, built on the Belfast roof principle, except that the members of it are all of steel. The roof principals from the old constructional department have been utilized, it was pointed out, in building a new erecting shop, 230 ft. long by 35 ft. span, fitted with overhead cranes, and a shop for storing heavy gas-holder and other erecting tackle.

In the adjoining foundry the visitors found signs of great activity; large cast-iron pans for chemical purposes, being in course of moulding. The new fitting shop (which has been described in the "JOURNAL") was finished some years ago, since when many modern tools and equipment have been added. The length of the shop is 250 ft., and the width 110 ft. At the present time there are three telpher plants in course of construction for the Dalmarnock Gas-Works, Glasgow—five-ton machines of special design, also other telephers suitable for dealing with skips and grabs. There are various telphers passing through for steel-works, and bottom flange telphers for dealing with grabs, and telphers for industrial purposes. There are also under construction electric wagon tippers for use in discharging railway wagons. There were also seen large coal-charging lorries for coke-ovens and special telpher track switches for the Dalmarnock telphers of Dempsters' patent design, which were shown temporarily in position. The visitors were reminded that since the war broke out gas-works extensions and repairs had been reduced to the minimum; the consequence being that Messrs. Dempster had to turn their attention to other forms of work of national importance for Government and munition purposes and for chemical plant. The particular efforts of the firm have developed in connection with the construction of labour-saving appliances, such as telpherage plants and conveying machinery of every kind, including ropeways. It might be mentioned that Messrs. Dempster make their own gas for power; but their electrical energy is secured from the town's supply. The lighting throughout is high power gas.

On the yard wall of the spacious offices the visitors noted, with interest, an exhibition plate—an old mouthpiece lid of the original firm of Butterfield and Dempster, in 1858.

ADJOURNMENT FOR TEA.

After the tour of inspection, the visitors were entertained at afternoon tea by Messrs. Dempster.

The PRESIDENT moved a hearty vote of thanks to Messrs. Dempster and the members of the firm and staff who had so readily given up their Saturday afternoon to the party.

The VICE-PRESIDENT (Mr. E. Garsed), in seconding, said those who had been present on the previous visit could see remarkable changes, which all pointed to progress in every department of the gas industry. Messrs. Dempster, as contractors, were keeping ahead, and it was up to the gas engineers, as gas producers, to keep in touch with such people. There had been some thought of conjointing the visit with a visit to the Elland Gas-Works; but he hoped that on some future date this would be possible, when there might be an opportunity for a still further visit to Messrs. Dempster's works. The spirit in which Messrs. Dempster had met the request for a visit was the spirit with which the Association was now constantly met, and it was the spirit which would help in the advancement of the gas industry generally.

The resolution was carried unanimously.

Mr. BROADHEAD, in response, expressed his great pleasure to see such a gathering. The fact of so many young engineers giving up their leisure half-day spoke well for the industry. There was no doubt that the status of the "Juniors" had been raised very greatly throughout the country by the Associations, and that the future engineers of large undertakings would be better qualified to discharge their responsibilities through the benefits derived by visits to various works than they would otherwise be. The firm's works at Elland to-day were very different from what they were when the Association was last there, and vastly different from the time when he (Mr. Broadhead) first came there, in 1883, as a junior. The old works had been scrapped, and the visitors saw to-day what he had no hesitation in claiming to be one of the finest constructional engineering works in the country. The erection of the new works over the old without disturbance of operations spoke most creditably for the staff, and particularly for Mr. Hanley, the Works Manager. He thought they would all agree that the firm were equipped to carry out the best of work when the war was over. There was no denying that they had made very rapid strides in connection with labour-saving appliances, and had taken an important part in the task of enabling many undertakings to carry on under the present great shortage of men. The slackening in vertical retort erection at gas-works had enabled the firm to concentrate attention on perfecting their system of this equipment.

A VERTICAL RETORT DEMONSTRATION.

After tea, the party adjourned to the large new drawing office, where Mr. Toogood, with the aid of drawings and model experiments, demonstrated the firm's system in vertical retorts.

Mr. W. B. M'LUSKY, the Gas Manager to the Halifax Corporation, who was present as a visitor, voiced his appreciation, as "a mere senior," of the afternoon's proceedings, and expressed his gratification to Mr. Toogood for his detailed explanations of the vertical retort system. He spoke with confidence in expressing the view that the Dempster-Toogood system was very superior to most, and said the point he would emphasize most on the attention of the visitors was that of the firm's provision for taking hold of the fuel gas and igniting it, and then distributing the heat evenly throughout the retort. Messrs. Dempster had displayed very great ingenuity in dealing with retorts of all kinds. The matter of getting the secondary air delivered had always been a difficulty, in avoiding cross-cutting; and the full width at the bottom of the Dempster-Toogood vertical retort was a great advantage.

ISLE OF WIGHT GAS ASSOCIATION.

The Thirteenth Annual General Meeting of the Isle of Wight Gas Association was held at East Cowes on Wednesday, the 30th ult.—Mr. ROBERT FISH (East Cowes) in the chair.

Mr. FISH, in welcoming the members, pointed out the anxious times the Island gas companies were going through, due to the very high cost of freight on their seaborne coal. Freights to the island had risen over 500 p.ct.; and under these conditions it was very necessary to obtain every foot of gas procurable from the coal. The question of putting down blue water-gas plants would have to be considered if freights continued at this high figure.

In the report of the Management Committee, allusion was made to the death of Mr. F. F. Farrand, of Ryde, and of Mr. William Halliday, who had acted as Hon. Auditor to the Association since its inception.

Mr. J. S. Ineson (Ventnor) was elected Chairman for the present year, and Mr. F. C. Taylor (Shanklin) Deputy-Chairman. Mr. S. W. Ibbotson (Newport) was again elected Hon. Secretary and Treasurer; and Mr. Frank King, Hon. Auditor.

A donation of three guineas was voted to the benevolent fund of the Institution of Gas Engineers; and a hearty vote of thanks was passed to Mr. Fish, who had acted as Chairman during the past year.

The afternoon finished up with a very pleasant and instructive visit to a local works, where aircraft was seen in all stages of manufacture.

THE FUNDAMENTAL PRINCIPLES OF GOOD LIGHTING.

A paper on the above subject has been recently published in the "Journal of the Franklin Institute of Philadelphia," by Mr. P. G. Nutting, Ph.D., Director of the Research Laboratory of the Westinghouse Electric and Manufacturing Company.

As practically any required quantity and quality of light, with fixtures giving any desired direction and ratio of scattered to direct light, are now at command, the author considers the time ripe for the research engineer to determine what lighting is most desirable, and to lay down general principles for illuminating practitioners. A great deal of work in this direction has already been done and the results available in terms which Mr. Nutting has abandoned for more advanced nomenclature. The data now presented are of interest and value; but an ordinary student must, with the author, accustom himself to think in "brightness" units of lamberts and millilamberts.

Mr. Nutting states that, for lighting to be satisfactory, it is both necessary and sufficient that it should produce good seeing conditions. Fundamental principles must therefore be derived from the requirements of vision, and these, in turn, from the laws governing the sensation caused by any given exposure of the retina to light of any flux density and density distribution. A table is given showing that: (1) Good seeing (covering discrimination—that is, contrast of detail-acuity, efficiency, and comfort) is related by psycho-physical laws to (2) retinal flux of light (intensity, distribution, and colour), which, again, are deducible by optical laws from (3) objective, brightness, and contrast. These are in their turn derived from (4) illumination and reflecting powers of objects, and the latter from (5) intensity and position of light sources. This outline of the principles of illuminating engineering emphasizes the importance of the psycho-physical relations between light flux (in, say, lumens per square millimetre) at the retina and the corresponding perceptions, and also indicates why good lighting cannot be defined in terms of illumination and the reflecting power of objects illuminated, nor yet in terms of brightness and contrast in the field viewed. In other words, since lighting must be such as to give discrimination, acuity, efficiency, and comfort, a specification of retinal flux of light is not sufficient, and would fail to take account of the entire visual factor. Mr. Nutting thus indicates the difficulties which lie in the way of attaining the object aimed at; the ability of the eye to distinguish detail not being a fixed quantity, nor a function of a single variable. This ability depends upon: (1) The absolute brightness of the object viewed, (2) the brightness or darkness of its surroundings —*i.e.*, upon peripheral vision—and (3) the brightness of objects just previously viewed (adaptation).

It is not proposed in detail to follow the author in his consideration of each of these relations; but some of the chief statements made are of interest. For instance, Mr. Nutting gives the whole range of intensities over which the eye operates, from the threshold of vision to the blinding brightness which is the upper limit of adaptation, as from 0·000001 millilambert at the threshold up to 10 lamberts. Incidentally, it may be noted that the lambert is the unit, adopted by the American Illuminating Engineering Society, as being "the brightness of a perfectly diffusing surface radiating or reflecting one lumen per square centimetre." The millilambert (0·001 lambert) is regarded as the preferable practical unit, and is equal to a surface brightness of 0·929 or (say) 1 ft.-candle. The brightness of 10 lamberts is given by Mr. Nutting as about that of a sheet of white paper under direct normal sunshine. The clear noon sky, the full moon, and a gas-flame [kind not stated] are each about one lambert in brightness. The lower

limit for reading with comfort ordinary print as about 0·01 millilambert.

The author remarks that at any given general level of brightness—say, that of indoor artificial lighting—there are three visual constants of chief interest: The lowest perceptible brightness, the least perceptible difference in brightness, and the highest tolerable brightness. These constants are a measure of what we can see and of how well we can see at that brightness level.

Threshold sensibility, or the lower limit of vision, varies enormously with the brightness of the field to which the eye is initially adapted; and the author's diagram of the variation of sensiblity with brightness shows comparatively a straight line, indicating the simplicity of the relation between the state of the retina and the flux density upon it.

Discrimination, or the power to distinguish slight differences in light and shade, is stated to depend somewhat upon sharpness of definition and differences in colour, but principally upon contrasts in brightness. Vision is best when contrasts are about 10 to 1; but it is comfortable when the ratios are as low as 51:50, or as high as 20:1. With contrasts as high as 100:1, vision is neither acute nor efficient.

A brief note is made on glare sensibility. For any eye, adapted to any given brightness level, there is another much higher brightness, just painfully bright, in which moderately contrasted detail cannot be distinguished. Only rough measurements of the glare limit were possible; but a determination was attempted, and the results show a uniform relation between glare and brightness.

Mr. Nutting furnishes an interesting summary of data on threshold limit, discrimination, and glare; and this is reproduced:

Field Brightness.	Difference Fraction.	Discrimination Factor.	Threshold Limit.	Glare Limit.
0·000001 m.l.	(1·00)	1·0	0·00000093 m.l.	20·1 m.l.
0·00001	(0·66)	1·5	0·0000042	40·7
0·0001	0·395	2·5	0·000019	89·
0·001	0·204	4·5	0·000087	86·
0·01	0·078	12·8	0·00039	400·
0·1	0·037	27·0	0·00174	810· m.l.
1·0	0·0208	48·2	0·0081	1·66 l.
10·	0·0174	57·5	0·036	3·47
100·	0·0172	58·1	0·28	7·25
1000·	0 0240	41·7	2·15	14·45
10000·	(0·048)	(20·9)	(232·)	30·90

As an example of the use of this table, it will be seen that an average eye adapted to a field brightness of 0·1 m.l. can just see a contrast of 1·037:1—the discrimination is about half (27/57) its maximum value. The deepest shadow in which it can see anything is 0·0017 millilambert in brightness and the brightest tolerable high light is 800 millilamberts.

The illuminating engineer is chiefly concerned with four quite distinct brightness levels, namely:

0·001 m.l. Exteriors at night, street lighting.
0·01 m.l. Interiors at night, interior artificial lighting.
1·0 m.l. Interior daylight lighting.
1·0 l. Exterior full daylight lighting.

The above data refer to vision with surroundings of nearly the same brightness as the object directly viewed. When this peripheral field is much brighter or darker than the centre, vision is seriously affected. In other words, central retinal sensibility depends upon the total light striking the retina and its distribution, as well as upon the light striking the fovea. The magnitude of the peripheral effect is shown by a single experiment. If a blank space be viewed steadily through a black-lined tube, 3 or 4 centimetres in diameter and, say, 50 centimetres long, held close to the eye, the spot seen through the tube grows rapidly in brightness until at the end of about a minute it appears fifty to a hundred times as bright as seen with the unshielded eye.

The opposite effect, with surroundings brighter than the centre of view, may also be demonstrated, but requires laboratory apparatus. Both kinds of non-uniform field lead to visual discomfort; both in extreme cases cause a sensation of glare. Ives' investigation of photometric sensibility showed that the maximum of sensibility is obtained with nearly uniform brightness of the whole field of view.

Dealing with adaptation to varying brightness, Mr. Nutting points out that vision is practically as comfortable and acute at the mean brightness of a well-lighted interior (0·1 millilambert) as in full daylight with a mean brightness level ten thousand times as high (1 lambert). He states that the visual mechanism automatically adapts itself to the changed conditions by some means not very well understood. Since in ordinary vision the eye is constantly shifting from one object to other objects either lighter or darker, an interesting table is furnished indicating roughly the rates of increase and decrease in sensibility in an ordinary case. The data refer to changes from complete darkness to a brightness of 25 millilamberts (representing the brightness of a sheet of paper in a well-lighted room on a bright day), and *vice versâ*.

Rates of Increase and Decrease of Sensibility.

Time.	$B_0 = 0$, $B = 25$ m.l. Sensibility Decrease.	$B_0 = 25$ m.l., $B = 0$ Sensibility Increase.
1 second ..	2·1 times ..	1·6 times
2 seconds ..	4·2 ,, ..	2·6 ,,
5 seconds ..	16·2 ,, ..	7·6 ,,
10 seconds ..	58· ,, ..	14·4 ,,
10 minutes ..	120· ,, ..	20·9 ,,

For example, if an eye adapted to darkness be suddenly exposed to 25 m.l. its sensibility drops to 1·16 in 5 seconds and a subsequent rest of 10 seconds will by no means restore its full sensibility.

Mr. Nutting adds that where the eye has been sensitized to a given level of brightness and the light suddenly removed, the rate of growth of sensibility in darkness varies not only with the initial state of adaptation, the colour of the light, and the contrast used in the test spot, but also with the individual, his previous states of adaptation extending back several hours, the attention exercised, and similar causes. The first-mentioned variables are the most important. The suggestion of such variables by the author is a wise one, since it has ever to be remembered that no data, however exact, can apply equally to all persons. With this in mind, one turns with interest to the author's concluding remarks as to the application of the investigations to practical lighting.

The objective of all lighting is to secure visibility of detail in those objects to which attention is directed. The detail to be observed may be: (A) mere outlines of large objects, such as are required in riding along a country road at night, (B) the outlines of small objects, as in reading, or (C) the minutest detail which the eye is capable of resolving.

Mr. Nutting says that in Class A little illumination is required, but gives a relatively high standard—that of a high full moon supplemented perhaps by a little local lighting as ample if not ideal. The eye in this class operates at low efficiency, and little attention need be paid to the direction of the lighting or to the ratio of specular to diffuse light. Spot-glare is to be avoided, since the retina is in a supersensitive condition; and sensibility may be easily depressed and objects rendered invisible.

Class B covers the vast majority of ordinary working conditions. Here contrasts are ample, and the observation of fine detail not required. The specification of a discrimination factor of not less than half the maximum is reasonable. Any illumination that will produce a brightness level of not less than 0·1 millilambert nor over 7000 millilamberts is tolerable, though brightnesses ranging from 1 to 250 millilamberts are to be chosen. The difficulty lies in the provision of the proper ratio of direct to diffuse light, and their proper direction. There should be neither extreme high lights nor dense shadows within the field of vision, and the details to be observed should present sufficient, but not too great, a contrast—that is, contrasts over 50:49 and under 50:1. Indirect lighting avoids the former, but almost completely suppresses contrasts, particularly on glossy or uneven surfaces. Mr. Nutting regards the golden mean for good average seeing as probably not far from 30 p.ct. diffused light.

In the highest class, C, where the minutest detail is critically observed—as in the case of drawing, needlework, &c.—only the very best conditions will prevent visual discomfort and eyestrain. The most suitable lighting is that limited to nearly a single direction, and that quite elevated. The light from the sky through high, well-spaced windows is very nearly ideal. Indirect lighting from numerous sources is bad, and semi-indirect lighting, with units closely assembled and at one side, is probably the best form of artificial lighting. No part of any lighting unit within the range of vision should exceed 250 millilamberts in brightness, nor should contrasts ordinarily visible exceed 100:1.

Increasing the Demand for Coke.—That the Denver public are rapidly learning the value of coke as a fuel is indicated by the disposal of over 50,000 tons during the twelve months ended April 1. This was accomplished by educational work, mostly on the lines of utilization for domestic purposes, carried out by the coke department of the Denver Gas and Electric Light Company. Only 12,000 tons were taken by merchants; the remainder being retailed direct to the user. A premium of 50 c. per ton is allowed during the summer months; and, as a result, more than 15,000 tons were stored in cellars last summer. The Company have recently put into operation an elaborate system, comprising storage bins having a capacity of 1200 tons, conveyor belts, screening, and separating appliances. The coke can be taken from stock or from the retort-house direct to the screen and bins, where the different sized products can be loaded into railroad cars or trucks. Ten trucks and two cars can be loaded at the works simultaneously.

Gas is the Safest.—According to Mr. Wilbur E. Mallalieu, the General Manager of the National Board of Underwriters in the United States, much less property is lost through conflagrations originated by gas than by those arising from other sources. The value of the property so destroyed in 1915 was $937,714, and the best authorities consider that, given proper conditions, this source might be entirely eliminated. Petroleum and its products are responsible for a loss of $1,467,513, and electricity for no less than $11,142,559. The "American Gas Engineering Journal" remarks that, while the large item charged against electricity is classed as "partly preventible," the small one for gas is rated as "strictly preventible." The results already achieved with gas are largely due to the educational efforts put forth by gas undertakings, and will be greatly assisted by the general introduction of free maintenance of gas appliances. Familiarity with the internal fittings on the part of gas employees affords splendid opportunity for pointing out dangerous or defective conditions; and there is also room for perfecting appliances in the direction of making them "fool proof."

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Incidence of War Cost in Relation to Gas Sliding-Scales.

SIR,—All agree that post-war conditions and sliding-scale adjustments should synchronize; also where hardship exists the earliest relief is opportune. Interference with sliding-scale figures now is dangerous; but grievances can be met otherwise.

Gas capital is a national asset for war purposes, as it speeds-up munitions output, produces large quantities of material for high explosives, and fills a national need in many directions—evidenced by the Coal Controller's present activity. Therefore, decline should be prevented in capital value and earning power.

It is not necessary to suspend or alter, simply to modify—not to remedy, but arrest. This distinction cannot be too clearly emphasized. Modification could be effected reasonably at the neutral zone—*i.e.*, at the point where the standard dividend is untouched in its relation to price. The zenith of increased expenditure is not yet reached; but the principal items involved appear to be:

(1) Net cost of raw material (especially oil).
(2) Carbonization wages.
(3) Repairs and renewals.

	Last Pre-War Trading Year.		Estimated Cost, 1917.
	Per 1000 C.Ft. Sold.		
(1) (2) Net cost of raw material and carbonization wages .	7¾d.	..	15¼d.
(3) Repairs and renewals of buildings, plant, mains, services, and meters . .	5¼d.	..	4¼d.

The incidence of increased cost extends beyond these items; but why enlarge when raw material and wages together have been doubled, notwithstanding the Coal Prices (Limitation) Act, which protects price rather than quality?

Decline in repairs and renewals is, of course, only apparent, as essential work impossible now will have cumulative effect later. But to the pre-war cost 33⅓ p.ct. may reasonably be added to find present cost. Petroleum cannot be obtained (by those who unfortunately need it) at under 11d. per gallon, but who have yet charged 11d. in their accounts? A price very much below this figure renders oil unremunerative, and involves a greater manufacturing loss than would be the loss on standing charges by diminished output. Yet Government Departments urge the public to use gas and conserve coal.

The Finance Act—a measure to prevent war profit—provides for equity; but the sliding-scale under war conditions conflicts with this, and creates injustice.

But what of capital? Output grows, while extensions "mark time." Post-war money will be dear; and the public will be loth to subscribe to new issues.

Surely the gas outlook is not bright; nor does the industry deserve the severe penalties imposed by the sliding-scale, all of which were unforeseen, and also not intended by Parliament, to whom we can now appeal collectively for a short Act granting power to the Board of Trade to furnish temporary relief during the period of the war and for a limited period afterwards. Such a measure would prejudice none, while placing all upon an equality—municipal, sliding-scale, and maximum-dividend undertakings.

EDWIN UPTON.

Liverpool, May 30, 1917.

Adulteration or Dilution of Gas.

SIR,—I have followed with great interest the discussion in the "JOURNAL" regarding the adulteration or dilution of gas; and, following your invitation to gas engineers in the number for April 10, I think it may be of some interest to know in what way we here, in Copenhagen, try to overcome the coal difficulty, which naturally is much more serious than in England—having only very little gas coals at our disposal, especially during recent months.

We commenced some year or more ago to mix gas coals with steam coals—the latter being the more abundant. At first, we used a smaller quantity of steam coals; but later on about half-and-half. The worst thing with the steam coals was the bad coke; and also in this condition they were variable. Experiments in our small test plant informed us as to the value of the steam coals—testing the amount of gas, the calorific power, and the consistency of the coke. The first two of these proofs gave, of course, a result lower than from gas coals, but generally tolerably good; but the coke was nearly always so bad (often like powder) that it could not be used under the retorts. Then the steam coals were mixed with the gas coals in such proportion that we could burn the coke and also sell it, in spite of its somewhat inferior quality.

This was not sufficient, and for a long time we have used 20 to 30 p.ct. of carburetted water gas, at first with ordinary carburation, but later only half of it. At last we stopped-off the oil; our stocks of oil being very small, and with no prospect of having more of it. We used at first only 20 to 30 p ct. of blue water gas; but, finally, for the last few months, 50 p.ct. of blue water gas was mixed before the condensers with the coal gas made from half steam coals and half gas coals. Besides this, we use 2 p.ct. of air for the oxide purifiers.

The calorific power of the gas—measured daily—is approximately 4000 calories per cubic metre (gross). The illuminating power is, of course, very low; but nobody takes notice of this.

It was necessary to advise all the consumers to, more or less, close the air-holes on their cooking apparatus; and this was done by distributing printed information. Generally the air-holes were closed by a strip of paper with some small holes pierced in it; and the gas burned well. Also the incandescent burners were adjusted by closing the air-holes; and they are acting quite as well as with ordinary coal gas—usually better. The flat-flame burners are all done away with.

The Corporation tried in March this year to diminish the consumption of gas by allowing only a fixed and moderate amount of gas, in proportion to the number of members in a family; and when the consumption is 25 p.ct. more, the price of the extra gas is three times higher than ordinary (which is about 1½d. per cubic metre), going up to eight times the ordinary price for any gas consumption higher than this. In spite of this high price, the consumption was not reduced very much. At the beginning, the reduction compared with the year before was about 30 p.ct.; but more and more the consumption is going up again, and the reduction is now only 15 to 20 p.ct. less. One reason is, perhaps, that there is very little petroleum in the city, and so people are obliged to use gas alone, when they need to prepare their food.

In these hard times, people are not unreasonable, and comparatively few complaints are heard—indeed, not more than usual.

I may mention that in most households "hay cookers" are used. They are boxes (17 in. × 17 in. × 15 in. high), of ⅞ in. thick wood, lined inside (bottom and sides) 3 to 4 in. thick with hay or crumpled newspaper. The pot (with cover) containing the meat to be boiled is kept heated to the boiling point in a quarter to half an hour on the gas-stove. Then (with the cover on) it is quickly placed in the box, and covered carefully with a cushion filled with cotton or similar isolating stuff. The cushion must be somewhat larger than the pot. The box is then closed tight with a wooden cover. In this manner the meat will remain at nearly the boiling point for several hours; and it will remain hot six to eight hours, thus saving much gas. It is ascertained that the meat is better boiled in this box than usually over an open fire; and the meat is never burned. I do not know if this is used in England; otherwise it is much to be recommended.

Our gas at present contains about 22 to 25 p.ct. of carbon monoxide, and is, of course, more poisonous than ordinary coal gas. It was deemed necessary to warn the consumers to keep their gas-pipes tight, and close the stop-cocks of their meters when they observed the slightest smell of gas. There have been some few accidents; but in all cases there has been some great neglect with very leaky pipes, open burners not lighted, &c. Some medical men proposed to put "perfume" in the gas to warn consumers. Several things were tried in our laboratory, but none with any good results. The best thing was to mix the uncarburetted water gas with coal gas; and we found by experiments that only 20 p.ct. of coal gas was more than sufficient to give a smell of practically the same strength as pure coal gas, which has also the great advantage that the smell is known to everybody.

This is our experience; and we only wish we were in a position to make more blue water gas, but our plants are working at full power.

You will see that this is very far from what a gas engineer was earlier accustomed to; but still we should be more than satisfied if the situation does not get any worse than now.

J. O. V. IRMINGER.

Copenhagen, May 13, 1917.

REGISTER OF PATENTS.

Gas-Producers.

RITER-CONLEY MANUFACTURING COMPANY, of Leetsdale, U.S.A.,
No. 17,256; Dec. 8, 1915.

According to this invention, a heated draught current, such as one supplied to a gas-producer, is maintained at a predetermined temperature above the maximum atmospheric temperature, and is uniformly saturated. In the plant shown in the specification, in which an air-current so controlled is supplied to a gas producer (the gas from which is used for heating gas-retorts), one part of the air enters the plant through a drum which is heated by the waste-gas flues from the retort-furnace, and the remainder through a pipe—the proportion being regulated by a damper. The mixture passes to a saturator containing coke, on which water is sprayed in amount governed by a float in a reservoir. The damper is operated by a motor, the switch of which is moved in either direction by means connected with a thermostat in the outlet pipe from the saturator. From the saturator, the air is delivered either directly to a manifold by a blower, or partly through a pipe and partly through a coil in the waste-gas flue—the proportion being regulated by a thermostatically controlled damper similar to the damper formerly referred to. Water or steam also may be injected. The heated air current passes from the manifold through flues to the grate of the producer; while the producer gas passes through flues to the combustion chamber, and secondary air for combustion through flues both of which are heated by waste gases passing on their way to the exit flue.

Heating Burners.—No. 100,896.

BRADSHAW, G. D., of Johnstown, Penn., U.S.A.

No. 10,031; July 17, 1916. Convention date, July 15, 1915.

This burner consists of a pipe of substantially uniform section (preferably provided with an elbow of considerable radius, in order to ensure uniform flow of gases), in which is an obstruction whereby the area is restricted and the gas velocity consequently made greater in the vicinity. From the point of the greatest size of the obstruction, it is tapered down to a comparatively sharp point near the exit end of the tube—thus giving the effect at the outer end of an expanding or increasing section and reducing the friction and eddying losses to a minimum. At the point of the greatest contraction of the tube, due to the obstruction placed in it (and near the point of highest velocity of the gases) there is provided within the obstruction, which is hol'ow, a number of openings connected to the external air by a pipe of smaller size than the main gas-pipe.

By reason of this construction, the total head at the burner outlet is composed of two items—namely, the static head and the velocity head;

and as the stove contains gases at or about atmospheric pressure, the total head is the velocity head alone. At the point of highest velocity in the burner the total head, due to the absence of losses by reason of the expanded cone construction, is equal to the total head at the outlet end of the burner; but as the velocity head at the point of greatest velocity is greater than the velocity head at the outlet end of the burner, the static head at the point of greatest contraction must be negative, or a minimum quantity. Consequently, if opportunity is given for the external air to enter at this point it will do so; and it will be drawn into the burner at a velocity proportional to the square root of the negative head. As the square root of this negative head is also proportional to the gas velocity, it follows that the gas and air velocity will also be proportional to each other, whereby the result of the construction is accomplished, and the mixture of air and gas automatically regulates itself; so that "the combustion is perfect notwithstanding a wide variation or range in the velocity or pressure of the gases which are supplied to the burner."

The openings in the outer burner tube may be considered as auxiliary, and are provided for the purpose of giving a greater area for the inlet of air with the combustible gases in the burner, as in some instances these additional exterior openings are needed for the reason that, on account of the comparatively small size of the interior air inlet pipe, the burner must have an area of air openings at or near the contracted portion, large enough for the air to be supplied in accordance with the invention.

Gas-Furnaces.—No. 105,810.

IONIDES, JUN., A. C., of Porchester Terrace, W.

No. 6757; May 11, 1916.

This invention consists in a furnace having an open hearth bottom surrounded by walls wherein one or more jets or nozzles supplying a gaseous mixture, "correctly proportioned for combustion," are arranged to produce a rotary or spiral motion of the heating elements, which finally leave the furnace in a downward direction and "symmetrically with regard to the hearth and walls." It further consists in a furnace in which the hearth is formed as an annular depression surrounding a somewhat elevated central portion, and the heating elements leave the furnace by a central flue passing downwards through this elevated portion.

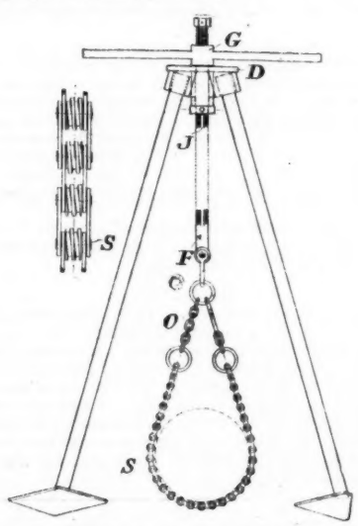
The combustible gaseous mixture forming the heating elements for the furnace is consumed as indicated in patent No. 15,455 of 1909 and pressure regulating devices of the type described in patent No. 15,758 of 1913. The combustible mixture may be distributed to the various jets or inlets of the furnace by a distribution system of the type indicated in patent No. 102,983, with mixing devices and nozzles of the type shown.

Device for Laying and Supporting Pipes. No. 105,858.

DONALD, P. G., of Upper Thames Street, E.C.

No. 13,368; Sept. 20, 1916.

The device, according to this invention, comprises a vertical externally screwed rod carrying a chain or strap in which the pipe can be slung; an internally screwed boss around the rod, and having a handle-wheel or tommy, by which the boss can be rotated, to raise or lower the pipe, together with a stationary platform for carrying the boss; and legs for supporting the platform, with flat base-plates to prevent sinking into the ground. The chain sling has rollers which come in direct contact with the pipe to minimize friction when the pipe is rotated for the purpose of screw-jointing.



Donald's Pipe-Laying Device.

The cap or platform D has a tube serving as a guide for a vertically movable rod F (threaded over the greater part of its surface), which enables it to be supported by a correspondingly internally threaded boss G passed around it and carried by the platform. A keyway J is cut along the rod (across the threads), and a key-pin is screwed through to the keyway so as to prevent the latter from turning, but allowing it to move vertically. The bottom of the rod F carries a shackle and rings connected to one another by a special chain O for carrying the pipe slung upon it. The chain carries rollers S spirally ribbed, the effect of which upon the rollers of the chain is that the pipe perforce travels longitudinally while being rotated in the sling. Thus not only is friction minimized, so that a heavy pipe can be manipulated by only one or two men, but accurate positioning of the pipe and true alignment with the adjoining pipe can be assured during the screwing-up process.

Incandescent Mantle Rings.—No. 105,815.

CONVEX INCANDESCENT MANTLE COMPANY, LTD., and HERSEY, M. H., of Bethune Road, N.

No. 7280; May 22, 1916.

This invention relates to mantle rings with tubular extensions, to which inverted incandescent gas-mantles are attached, and by which they are suspended from the gas-burners. It is designed to provide means whereby the flame jet, issuing from the burner nozzle, is shaped by a tubular extension on the mantle ring to the actual shape of the mantle—filling it equally upon all points. The extension is provided with a central conical opening diverging downwards and outwards at such depth and diameter as to compress and form the shape of the flame jet as it enters the interior of the mantle. The ring has a solid collar or horizontal flange (in the same plane as the lugs) of such a width as to prevent the heat impinging upon the mixing chamber and causing back-firing. The ring acts as a smoke and soot protector—preventing the formation of waste products and the consequent soiling of the burner. It also prevents soot and solid waste products dropping into the mantle itself.

Gas-Stoves.—No. 105,981.

PARTRIDGE, A. E., of Sudbury, Middlesex.

No. 6468; May 5, 1916.

This invention refers particularly to a stove provided with a removable lining or box, adapted to be introduced into the ordinary oven of the gas-stove, in such a way that it constitutes an inner oven which can be externally heated by the heat passing between the walls of the ordinary oven and the outer walls of the casing. The box, which is open at the front, has flanges at the top and sides which extend to the edge of the ordinary oven, a hinged flap at the bottom which is adapted to extend to the lower edge of the ordinary oven, and legs for supporting the device in the correct position, according to the size of the stove with which it is to be used.

Treatment and Utilization of Gases Supplied to the Furnaces of Hydrogen Retorts.—No. 106,067.

BALLINGALL, J. M., and R. & J. DEMPSTER, Ltd., of Manchester.

No. 290; Jan. 6, 1917.

This invention, which relates to the gases supplied to a furnace containing retorts employed in the manufacture of hydrogen, has for its object to provide means whereby spent water gas from the retorts, also in conjunction with producer gas, may be so treated as to be capable of utilization in the furnace in a manner which will largely prevent deterioration of the retorts therein with more certainty than heretofore, or the treated gases will form a better reducing atmosphere than spent water gas used alone and without treatment. Also the gases, after use in the furnace, may be employed, according to this invention, for heating purposes involved in the initial process.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for May 31.]

Nos. 7274—7643.

BARKER, L.S.—"Gas cooking and heating stoves." No. 7523.

BROTHERTON & Co.—"Extraction of naphthalene salts, &c., from distillates of coal-tar distillation." No. 7485.

CADETT, J. W. T.—"Means for extending applications of fuels gaseous under ordinary conditions of atmospheric pressure and temperatures to purposes wherein portability is essential." No. 7642.

COLEY, H. E.—"Manufacture of bricks, crucibles, &c., fron zirconium." No. 7346.

COLEY, H. E.—"Refractory bricks, &c., and process of manufacture." No. 7347.

COLEY, H. E.—"Carbonaceous compound for use as an abrasive, &c." No. 7348.

GLASIER, H. H.—"Meters." No. 7330.

PERCY, W.—See Cadett. No. 7642.

PORTEOUS, J.—See Brotherton. No. 7485.

RIMINGTON, G. G.—"Geysers or water-heating apparatus." No. 7448.

SMITH, F. G.—"Charging gas-producers." Nos. 7435, 7436.

STYLES, T. W.—"Adjustable brackets for gas, &c., lamps." No. 7484.

WELLMAN, SEAVER, and HEAD.—See Smith. Nos. 7435, 7436.

WHITELOCK, E. D.—See Brotherton. No. 7485.

WILBRAHAM, E. C. B.—See Coley. Nos. 7346, 7347, 7348.

Sidmouth Gas Finances.—The Gas Committee have reported to the Sidmouth Urban District Council an overdraft on the revenue account of the undertaking of £860. The Chairman (Mr. J. G. H. Halse) remarked that, during three of the four years of the Council's ownership of the works, prices, &c., had gone up. They could not increase the cost to consumers above 12½ p.ct., although the cost of coal had risen 75 p.ct. After the war, he believed the undertaking would bring in a considerable profit to the town.

LEGAL INTELLIGENCE.

COAL TAR ANTISEPTIC AND ITS DISCOVERER.

The case of the remarkable coal-tar antiseptic which was reported in the "JOURNAL" of May 15 [p. 301], came before the Patents Court again last Thursday week, when there was a new applicant for licence, and Dr. Browning, its English discoverer, made a statement.

Dr. *Browning* explained how he came to employ the name in its abbreviated form of Flavin. He supposed that before the work he and those associated with him undertook, there was no knowledge that this substance was an antiseptic.

The CONTROLLER: The knowledge is due to purely independent British research work.

Dr. *Browning* said that Ehrlich experimented with 3·6 diamino acridinium, and gave the compound the name Trypa-Flavin.

The CONTROLLER said he and Sir Cornelius Dalton had been in consultation in the Medical Research Committee and the National Health Committee, and had come to the conclusion that they must not allow the manufacture of any applicant firm to be put on the market except under substantially the same name. Counsel said Flavin could never be a cheap substance. It was used in the proportion of one to a thousand in water; so that a ton represented an enormous quantity. He did not understand that it was likely to be sold to small retailers. In fixing a royalty, they had to remember that the patent was a coal-tar dye, and the British use was for something else. The matter was in its experimental stage. The Court would have no hesitation whatever in recommending that licences be granted to all the applicant firms to manufacture. The Court would consider whether the trade mark should be continued. A condition of the licence would have to be that no other substances of similar kind, intermediate or derivative, should be sold by the licencees except under names to be approved by the Board of Trade. The Board wished to secure that the same product was not put on the market by different manufacturers under different names. But with the name to be approved, manufacturers would not be precluded from using their own brand name or trade mark. The real merit of the discovery lay with Dr. Browning and his coadjutors. It was not in the least a case where the peculiar value had been made by the patentee. This had always to be borne in mind. The Board would examine the advantages of the scientific name—he thought Acri-Flavine was a fairly good title; and they would consider also whether the royalty should be 1 or 2½ p.ct.

Big Demand for Coal-Tar Dyes.

It is increasingly evident from the Patents Court that there is to be a big development in the British manufacture of coal-tar dyes. Attention was drawn in the "JOURNAL" to the application, on Feb. 22, of British Dyes Ltd. for a licence to use eighteen German patents, and to the similar application at the end of April of Messrs. L. B. Holliday & Co., of Huddersfield. A further application for this range of patents was heard by the Controller (Mr. Temple Franks) on Friday last; and British Dyes Ltd. are shortly to seek a licence to use a further score of German patents. The application on Friday was that of the Morton Sundour Fabrics, Ltd., of Carlisle, who asked to be permitted to manufacture under nearly twenty German patents registered chiefly in the names of the Badische Anilin und Soda Fabrik, the Farbenfabriken F. Bayes & Co., and the Farbwerke vorm Meister, Lucius, and Bruning. The dyes are of the anthracene series. The Carlisle firm say that they have spent £35,000 in experiments and plant, and are now putting up buildings and plant to cost a like amount. The Controller remarked that the German dye industry flourished by the parcelling-out of different sections. Could not manufacturers in this country agree among themselves to define each his separate province, and so push on with research work and manufacture simultaneously in these several departments? They had had three applicants already, and another was to come. If they were to have ten or a dozen manufacturers each trying to cover the whole range of these vat dyes, he was afraid there would inevitably be some wasted energy. He should advise that the licence be granted in this case, as in those before it, and upon the same royalty terms. But he foresaw that the time would come when he should have to consider how far they could grant licences wholesale to everybody who chose to apply for dye patents. Chemical manufacturers should see how far they could devote themselves to special branches, where not the whole range of patents and colours was involved.

Increased Consumption at Smethwick.—In a report issued by the Smethwick Gas Committee, they state that the amount of gas sold during the past year showed an increase of over 3¾ million cubic feet. They are experiencing great difficulty in arranging their coal contracts for the ensuing year. The Committee have placed contracts for over 37,000 tons; but they still require 10,000 to 12,000 tons more.

Gas Consumption v. Coal Storing.—Mr. C. Rowland Williams [whose retirement from the position of Lighting Assistant to the Engineer of the Great Western Railway was notified in the "JOURNAL" at the beginning of 1915] is still as firm a believer as ever in the merits of gas, the use of which he strenuously advocated for many years, both in his professional work and through the Press. In a letter to the "Globe" a few days ago, referring to the suggestion that householders should stock coal during the summer months, so as to be ready for any possible shortage next winter, he drew attention to the advantages of adopting the alternative of using gas for heating, cooking, &c., thereby not only securing cleanliness and saving of labour, but at the same time assisting the Government in the production of "T.N.T." and in relieving congestion on the railways.

MISCELLANEOUS NEWS.

BIRMINGHAM GAS DEPARTMENT REPORT.

Increase in Price Recommended.

At a Meeting of the Birmingham City Council to-day, the Gas Committee will present a report in which they state that in December last they recommended that the prices charged for gas should be increased, owing to the heavy burden thrown upon the Department by the steadily increasing cost of oil, coal, stores, and wages. The Council adopted the recommendation and sanctioned the increased charges as set out in the report then submitted. Unfortunately, the prices of coal, oil, and stores generally continue to increase; and the Committee are therefore compelled to ask the Council to further increase the charges to consumers as follows:

For Lighting, Cooking, and Domestic Purposes in One Premises.

	Per 1000 C.Ft. Per Quarter. s. d.		s. d.
Up to and including 100,000 c.ft.	from 2 4	to	2 7
Quantity in excess of 100,000 c.ft. up to 500,000 c.ft.	,, 2 3	,,	2 6
,, ,, 500,000 c.ft. up to 1,000,000 c.ft.	,, 2 2	,,	2 5
,, ,, 1,000,000 c.ft. up to 2,000,000 c.ft.	,, 2 1	,,	2 4
,, ,, 2,000,000 c.ft. up to 3,000,000 c.ft.	,, 2 0		
,, ,, 3,000,000 c.ft. up to 4,000,000 c.ft.	,, 1 11	,,	2 3
,, ,, 4,000,000 c.ft.	,, 1 10		

For Manufacturing and Motive Power in One Premises.

Up to and including 1,000,000 c.ft.	from 2 0	to	2 4
Quantity in excess of 1,000,000 c.ft. up to 2,000,000 c.ft.	,, 1 11	,,	2 3
,, ,, 2,000,000 c.ft.	,, 1 10		

Subject to 5 p.ct. discount for prompt payment.

Gas supplied through prepayment meters to be reduced as follows:

With gas fittings and cookers free, from 30 to 27 c.ft. per penny.
With cookers only free, from 34 to 31 c.ft. ,,

It will be observed that it is proposed to increase the lighting, cooking, and domestic charges under items Nos. 1 to 4 inclusive by 3d. per 1000 c.ft., and to charge 2s. 3d. per 1000 c.ft. for quantities in excess of 2,000,000 c.ft. per quarter, and further to increase the top rate for manufacture and motive power by 4d. per 1000 c.ft., and to charge 2s. 3d. per 1000 c.ft. for quantities in excess of 1,000,000 c.ft. per quarter. A corresponding reduction is proposed in the quantity of gas supplied per penny to consumers using gas through prepayment meters.

The Committee recommend that, as from the June reading of the meters, the scale of charges be increased as above mentioned.

LABOUR DIFFICULTIES AND PLANT EXTENSIONS.

Owing to so many of the employees having joined the forces, and to the difficulties of filling up the vacancies owing to the shortage of labour, it has been necessary to employ women in various capacities at the works. The Committee say their work has so far been carried out in a satisfactory manner. It also became necessary to apply to the military authorities for a working party to be sent to the Nechells works during last winter to assist in operating the new horizontal retort plant which was constructed in the autumn. These men rendered valuable assistance at a critical period, when the strain upon the resources of the department was very great. Without their help in keeping the carbonizing plant going, the supply of gas to the city would probably have failed. If the present shortage of labour continues, the position of the department next winter will be exceedingly difficult.

In order to cope with the increasing output of gas, it is necessary that improved carbonizing plant shall be provided to meet the estimated requirements for next winter. Arrangements have accordingly been made to erect Woodall-Duckham vertical retorts at the Windsor Street works, capable of producing 2¾ million c.ft. of gas per diem, in continuation of the type of plant installed at these works four years ago. Every effort will be made to complete the plant ready for gas-making next winter; but in view of the difficulties of obtaining materials and labour, no guarantee can be obtained as to the time of completion.

The Committee submit the statement of accounts for the year ended March 31, showing a surplus of £26,648, to be paid to the Finance Committee in aid of the borough rate.

THE ACCOUNTS.

The revenue from the sale of gas (less discounts and adjustments) amounted to £1,120,817; the total receipts being £1,743,156. On the other side of the account, coal (including oil, carriage, unloading, and all other expenses of depositing on works) figures at £968,613; the total expenditure being £1,582,247. This left a balance of £166,908 to be carried to profit and loss account. Deducting interest and redemption charges, &c., there remains the balance of profit for the year of £26,649, which compares with £26,274 a year ago.

The following are comparative statements for the years ended March 31, 1916 and 1917:

—	1916.	1917.
Gas sold during the year (cubic feet) .	10,796,405,600	11,156,832,900
New services laid during the year . .	4,085	1,298
Cooking and heating stoves sold during the year	1,474	1,499
Total number of cooking and heating stoves on hire	67,696	68,545
Total number of cookers supplied with prepayment meters	95,193	97,451
Total number of prepayment meters fixed	101,855	103,107

NORTHAMPTON AND THE CALORIFIC STANDARD.

The Board of Trade have issued a Draft Order under the Calorific Standard Act, and invite the observations of the Northampton Town Council thereon.

The Finance Committee report that considerable efforts have been made, in conjunction with the Swansea and other corporations, to induce the Board of Trade to insert conditions in any Order safeguarding the interests of the consumer on these points: (*a*) By a standard not lower than 550 B.Th.U. (*b*) Against any increased cost to the consumer. (*c*) Provision of incandescent burners at the cost of the company. (*d*) By increasing present pressures. (*e*) Establishment of a testing-station. (*f*) Limitation of the Order to the period of the war, or a short reasonable time afterwards. In regard to (*a*), (*b*), (*c*), and (*f*), the appeals to the Board have been unsuccessful.

The standard is fixed at 500 B.Th.U. So far as Northampton is concerned, free provision of incandescent fittings is not imposed upon the Company, nor, it is understood, upon the other companies concerned. Penalties are imposed for deficiencies in calorific power. The Company are called upon to provide, at the prescribed testing-place, such apparatus as shall be agreed upon between the Company and the Corporation, failing which the apparatus will be that prescribed by the Metropolitan Gas Referees. The pressure is increased to 15-10ths. It is provided that the Company, when required, within two years after the date of the Order, at the request of any consumer, shall supply and fix flat-flame burners, suitable in all respects for the gas, in substitution for any burners (not being incandescent burners) in use by the consumer before the date of the Order. Provision is made that, after the expiration of five years from the date of the Order, application may be made to the Board to reduce or increase the standard or pressure.

The Committee say it may be added that the Swansea Corporation have protested against the issue of their Draft Order, and strongly suggested the holding of a Departmental Inquiry to investigate various matters which have been submitted to the Board of Trade for consideration, and that no Order should be issued until such inquiry has been completed. The Board, however, have refused to hang-up the Orders pending the proposed inquiry, and propose to make them forthwith. The evidence established the following facts:

(*a*) That the substitution of a calorific standard of 500 B.Th.U. for the present illuminating standard of 15 c.p., would give a much lower illuminating power when burnt with a flat-flame burner; and that a considerable increase in the quantity of gas consumed would be necessitated by the alteration of the standard.

(*b*) That the proposed standard makes no allowance for the presence of inert constituents in the gas supplied.

(*c*) That the illuminating power of a luminous gas rises and falls with the calorific power.

(*d*) That gas of 500 B.Th.U. is not suitable for illumination when burnt in a flat-flame burner. An incandescent burner is required to give proper illumination.

(*e*) As the calorific value is reduced by the extraction of benzol and toluol, more gas has to be used to serve the same purpose, whether for lighting or heating, under higher pressure, because a greater quantity of gas has to be forced through the same pipes, or an increase in the area of the pipes would be necessary.

(*f*) That the adoption of a calorific standard of 500 B.Th.U. will enable considerable economies to be effected in the supply of gas to the consumers; and there is no surety that the consumer will obtain the benefit of such economy of manufacture by a corresponding reduction of price.

(*g*) It is clear that consumers will have to bear the cost of any necessary alteration to their present burners; and the evidence shows that the alteration of the standard will entail a considerable increase in the consumption of gas.

The Corporation have reiterated their previous views; and the Finance Committee feel they are "amply justified in making this protest in view of the expert evidence (virtually unchallenged) given at inquiries before the Board of Trade, on behalf of the corporations, railway companies, and other bodies, who were opposing various points in the Orders proposed to be made."

EDINBURGH AND LEITH GAS COMMISSIONERS.

At a Meeting of the Commissioners on Monday of last week, the Convener of the Works Committee reported that 195,000 tons of coal had been purchased for the current year, at an average price of 5½d. per ton below that paid last year.

It would appear that Mr. W. R. Herring's remark [*ante*, p. 252] that the retort-house men could, if they chose to do so, attend to a larger number of retorts, and so earn higher wages, has been resented; for in the minutes which came up for approval at the meeting it is stated that the Clerk was instructed by the Works Committee to inform the National Union of Corporation Workers that the Committee would be pleased to meet a deputation of two men from each of the shifts of retort-men, with an official of the Union, to discuss the question. The deputation, consisting of nine men and the District Secretary of the Union, were received a few days later; and after hearing particulars as to the period occupied in actual work during the eight-hour shifts, it was arranged that the Union should furnish a detailed statement, showing the time usually taken in each division of the work—charging, drawing, clearing choked pipes, &c.—and that the Engineers, after checking the statement, should report on it to the Committee. It was urged on behalf of the men that, owing to the arduous nature of the work, they could not look after a larger number of retorts.

It was further reported that a Joint Sub-Committee of the Works and Finance and Law Committees had been appointed to consider the salaries in the clerical departments, and as to any advances or bonuses that should be granted.

NOTTINGHAM GAS UNDERTAKING.

Further Substantial Results.

Though the gross profits from the Nottingham Corporation gas undertaking for the past twelve months naturally show a considerable falling off from the high figures recorded in the four previous years, the results of the annual working, embodied in the report of the Committee presented at yesterday's meeting of the City Council, are of an eminently encouraging character in contrast with the experience of many other authorities. A sum of £30,000 was this year to be allocated in relief of local burdens, compared with £35,000 last year and £39,000 in each of the four years immediately preceding 1916; and this result has been achieved without in any way impairing the solidity of the renewals fund, the building-up of which has formed one of the wise aims of the present administration.

Signed by the Chairman of the Committee (Mr. Alderman A. Ball, J.P.), the report states that the total income for the year amounted to £416,092, and the expenditure to £310,735, leaving a balance of £105,357 to be carried to the profit and loss account, *plus* £10,566 brought forward from last year, and banker's interest £4147, making a total of £120,070. After deducting the interest on capital, the contributions to the sinking funds, and placing £2500 to the depreciation of stoves, there remains a balance of £66,662 at the disposal of the Council. The Committee recommended that out of this amount the sum of £30,000 be handed over to the Finance Committee in aid of the general district rate, £10,000 be placed to the renewals fund, and that the balance be carried forward. During the year, the Committee have invested the sum of £140,061 in war stock.

The quantity of gas sold was 2,085,131,600 c.ft., against 2,151,028,500 c.ft., being a decrease of 65,896,900 c.ft. The gas sold for public lighting was only 1,679,300 c.ft., as compared with 102,143,500 c.ft. There has also been a considerable reduction in the sale of gas for ordinary lighting purposes. The increased consumption for commercial purposes has, however, more than counterbalanced this loss. The amount of gas sold per ton of coal carbonized was 11,802 c. ft., as against 11,736 c. ft. last year.

An advance on the scale of charges for gas used for power and gassing purposes was brought into operation on Jan. 1 last, averaging slightly less than 2d. per 1000 c.ft. Ready markets and good prices for coke, sulphate of ammonia, crude carbolic, cresylic, and naphthalene have prevailed throughout the year; and the price of creosote has recently improved. The outlook for pitch is, however, still very gloomy; and about 30 p.ct. of the production has been utilized in the horizontal retorts for gas-making purposes, with a view to relieving the position. The use of pitch in vertical retorts is, however, not considered advisable; and it is not proposed to utilize so large a percentage for gas-making purposes during the current year.

Substantial progress has been made in the erection of the Woodall-Duckham vertical retorts at Basford; and the installation may now be considered as completed. It is anticipated that this plant will effect economy in various directions. A Government controlled plant for producing concentrated ammoniacal liquor has also been erected at the Basford works.

Further substantial advances of war wages and bonuses have been granted to the workmen since the issue of the last report.

The Committee added that they "have pleasure in presenting the report, as it is much more satisfactory than was anticipated at the commencement of the year, owing to the advance in prices of all materials, war bonuses, &c.—the result having been obtained without increasing the price of gas for lighting and heating purposes."

MR. JOHN WILKINSON'S REPORT.

The report of Mr. John Wilkinson (the Engineer and General Manager), supplementing that of the Committee, contains much interesting information. It is his sixth annual statement, he records, in relation to the manufacturing department, that during the period under review, 170,218 tons of coal, 1565 tons of pitch, and 159,802 gallons of oil were utilized in course of manufacturing the following products: Coal gas, 2,137,061,000 c.ft.; and water gas, 60,920,000 c.ft.—total 2,197,981,000 c.ft. The water gas equalled 2·77 p.ct. of the total gas made. The quantity of tar manipulated at the Giltbrook chemical works was 1,817,522 gallons. These works were also used for the manufacture of 2998 tons of sulphuric acid (100 p.ct.), and 568 tons of oxide of iron for purification purposes. At the Basford ammonia works, the equivalent of 25,859 tons of 10-oz. ammoniacal liquor was distilled, which produced 1811 tons of sulphate of ammonia.

The following are the details of the sale of gas during the year: Ordinary consumers, 1,573,499,600 c.ft.; prepayment, 509,952,700 c.ft.; and public lamps, 1,679,300 c.ft.—total, 2,085,131,600 c.ft. The gas unaccounted for was 112,849,400 c.ft., or 5·13 p.ct., as compared with 70,174,500 c.ft., or 3·16 p.ct., for the previous year. There were 291 additional consumers connected to the mains, making a total of 83,424 consumers at March 31. The number of public lamps erected at the same date was 8182; but 7942 have been left unlighted in consequence of the restrictions. The average consumption per consumer equalled 24,994 c.ft., as compared with 25,286 c.ft. in the previous year. The demand for prepayment meters still continues; and at the end of the financial year 44,402 were in operation, being an increase of 1049 on the previous year. The position of gas in regard to its application for trade and domestic purposes, other than lighting, has been maintained.

The current prices of coal, gas oil, general materials, and labour, are largely in excess of the average costs of the past year; and, as increased prices for residuals are not anticipated, a further revision of the scale of charges for gas may become necessary. The expenditures for coal, and receipts for residuals, during the last three years were:

	Expenditure for Coal.	Receipts for Residuals.
Year ended March 31, 1917 . . .	£155,400 ..	£118,813
" " " 1916 . . .	124,455 ..	102,810
" " " 1915 . . .	103,626 ..	86,581

In conclusion Mr. Wilkinson states that the difficulty of obtaining general materials and labour has prevented the management from

carrying out the necessary repair and maintenance work in connection with the gas and chemical works and the distribution department; and considerable leeway in this direction will have to be made up when more normal times return. It will probably be advisable to bear this matter in mind when disposing of the profit apparently available.

A table attached to the reports, showing the development of the undertaking during the last ten years, reveals that within this period, including the sum just allocated, the amount voted in aid of the rates has totalled £349,000. Within this time, also, no less than £146,552 has been devoted to the special renewals account. Whereas in 1916 the coal carbonized amounted to 183,283 tons, last year the tonnage was 176,680; the cost having risen from 13s. 6·97d. to 17s. 7·09d. per ton. The total of annuity, loan, and debenture capital, and of consolidated stock now invested in the undertaking, is £1,046,385. It is noticeable that, compared with the preceding year, the receipts under the head of residual products have risen from £102,809 to £118,812; the biggest increase being in regard to coke and breeze, which (less labour and carriage) has yielded £70,434, compared with £56,558 in 1916.

The average price charged for gas during the past ten years has risen from 2s. 6·27d. per 1000 c.ft. in 1908 to 2s. 8·07d. in 1917; and it is not without significance to note that the financial results achieved last year were upon the basis of a considerably reduced tonnage of coal carbonized. Whereas the amount in 1908 was 194,890 tons, last year the coal dealt with was represented by 176,680 tons—an outcome of improved methods, which may yet be accentuated in regard to a portion of the new plant.

Price of Gas at Bradford.—To very general surprise, the Bradford Corporation Gas Committee on Friday decided that it is not yet necessary to advance the price of gas, despite the announcement of an approximate loss on the past year's working of £25,000. Now the full figures are available, it transpires that the loss is only from £9000 to £10,000; and in view of the fact that a new vertical retort installation at the Birkshall works will be operating during the coming winter, and of other considerations which may help the department, the Committee have not considered requisite a present advance in price.

Gas Workers and Parliamentary Representation.—It is not impossible that at the next general election an endeavour will be made to secure an addition to the numbers of parliamentary representatives whose particular claim to support among trade unionists depends upon their special standing as officials of the Gas-Workers' and General Labourers' Union. Evidence of this has been manifested in various directions; the latest illustration being afforded in the case of Nottingham, where it is now well understood that Mr. Arthur Hayday (the District Secretary of the organization) will be an aspirant to a seat at Westminster. The idea is contingent upon the probability of Nottingham receiving another parliamentary representative under the impending redistribution scheme.

SULPHURIC ACID CONTROL.

Maximum Prices Fixed.

The Minister of Munitions, in the exercise of the powers conferred upon him by the Defence of the Realm Regulations, and of all other powers enabling him, orders (under date May 29) as follows:

No person shall, as on and from June 11, 1917, until further notice, manufacture sulphuric acid except under a licence issued by, or under the authority of, the Minister of Munitions, and in accordance with the terms and conditions of such licence as to the quantities to be manufactured or otherwise.

No person manufacturing sulphuric acid shall, as on and from June 11, 1917, until further notice, use during any one calendar month more than 10 tons in all of 95 p.ct. sulphuric acid (or its equivalent in acid of other strengths) for the purpose of all other manufactures, trades, and businesses carried on by him except under, and in accordance with, the terms and conditions of a licence issued by, or under the authority of, the Minister of Munitions.

No person shall, as on and from the day following the date of this order, until further notice, supply sulphuric acid (including waste sulphuric acid) to any person except under, and in accordance with, the terms and conditions of a licence issued by, or under the authority of, the Minister of Munitions. Provided that no licence shall be required to supply not more than 56 lbs. of 95 p.ct. sulphuric acid (or its equivalent in acid of other strengths) to any person during any one calendar month. And provided also that any sulphuric acid supplied subsequently to the date of this order in pursuance of written directions or requests given or made by, or on behalf of, the Minister of Munitions previously to the date of this order shall, unless and until such written directions or requests are cancelled or withdrawn, be deemed to have been supplied under a licence issued under the authority of the Minister of Munitions within the meaning of this order.

As on and from the date of this order until further notice no manufacturer of sulphuric acid, or agent of such a manufacturer, shall charge or receive in payment for any sulphuric acid supplied by or through him a price exceeding the maximum price specified in the schedule to this order for sulphuric acid of the description and strength supplied. Provided that the maximum prices specified in the schedule hereto shall not apply to—

(*a*) Sulphuric acid supplied to persons outside the United Kingdom under export licences.
(*b*) Sulphuric acid manufactured outside the United Kingdom.
(*c*) Sulphuric acid made wholly from brimstone.
(*d*) Sulphuric acid specially purified for laboratory purposes.

All persons engaged in producing, manufacturing, selling, distributing, or storing sulphuric acid (including waste acid), or in any manufacture, trade, or business in which the same is used, shall make

WRIGHT'S FURNACES

for MELTING, ANNEALING, &c.

OVEN FURNACES Gas or Coke Fired.

Made to any size, for any heat treatment of metal, &c.

CRUCIBLE FURNACES Gas-Heated.

Tilting and Stationary Types for Melting Brass, Copper, Cupro-Nickel, &c.

Can be seen in operation at the Furnace Demonstration Room of

THE MANCHESTER CORPORATION GAS DEPARTMENT, 15, Whitworth Street West, MANCHESTER.

Demonstrations held daily until May 25th from 10 a.m. to 4 p.m. (Saturdays excepted).

Wright's "Lip-Axis" Crucible Furnace.

JOHN WRIGHT & CO.,

Essex Works, BIRMINGHAM.

such returns with regard to their businesses as may from time to time be required by or under the authority of the Ministry of Munitions.

For the purpose of this order the expression sulphuric acid shall include sulphuric acid of all strengths up to 100 p.ct. H_2SO_4, but shall not include acid containing free SO_3 (commonly called oleum or fuming sulphuric acid).

All applications in reference to this order (including applications for licences) should be addressed to the Director of Acid Supplies, Ministry of Munitions, Department of Explosives Supply, Storey's Gate, Westminster, S.W. 1.

The following schedule is annexed to the order, giving the maximum prices for the acids.

SCHEDULE.

Maximum Prices for Sulphuric Acid.

1.—*Weak Acid—i.e., Acid of all Strengths up to and including 90 p.ct. of H_2SO_4.*

		Maximum Price per Ton.	
Class A. ..	Arsenical acid ..	70s.	For acid of 140° Tw. at 60° Fahr., with an increase or reduction of 5d. in respect of each complete degree Tw. by which the specific gravity is more or less than 140° Tw. at 60° Fahr.
Class B. ..	Non-arsenical or de-arsenicated acid. ..	85s.	For acid of 144° Tw. at 60° Fahr., with an increase or reduction of 6d. in respect of each complete degree Tw. by which the specific gravity is more or less than 144° Tw. at 60° Fahr.

2.—*Concentrated Acid—i.e., Acid of all Strengths over 90 p.ct of H_2SO_4*

Monohydrate (H_2SO_4) Content of Acid. Per Cent.	Maximum Price per Ton. Class C. Arsenical Acid. £ s. d.	Class D. De-Arsenicated or Non-Arsenical Acid. £ s. d.
Over 90 and up to 91 . . .	5 3 0 ..	5 13 0
,, 91 ,, 92 . . .	5 9 0 ..	5 19 0
,, 92 ,, 93 . . .	5 15 0 ..	6 5 0
,, 93 ,, 93½ . . .	6 1 0 ..	6 11 0
,, 93½ ,, 94 . . .	6 4 0 ..	6 14 0
,, 94 ,, 94½ . . .	6 7 0 ..	6 17 0
,, 94½ ,, 95 . . .	6 10 0 ..	7 0 0
,, 95 ,, 95½ . . .	6 15 0 ..	7 5 0
,, 95½ ,, 96 . . .	7 0 0 ..	7 10 0

,, 96 in both classes, an addition of 1s. per ton for each complete one-tenth of 1 p.ct. of additional monohydrate.

PACKAGES.

All above maximum prices are for acid delivered into tank-wagon, tank cart, or tank barge at makers' works.

When the acid maker supplies the railway tank-wagons, he shall be entitled to make a further charge of not more than 5s. per ton for hire of such wagons. When the acid maker supplies the acid in his own drums, he shall be entitled to make a further charge of not more than 10s. per ton for filling and hire of drums. When drums are supplied by the purchaser, a charge of 2s. per ton may be made to cover the cost of filling. When the acid is supplied in the acid maker's own carboys, he shall be entitled to make a further charge of £1 per ton for filling and hire of carboys. When carboys are supplied by the purchaser, a charge of 5s. per ton may be made by the acid maker to cover the cost of filling.

EXTRA CARRIAGE.

In cases where a maker of sulphuric acid has, in order to supply his customers, to purchase supplies of acid from a third party, it will be permissible for him, in so far as this is a departure from his normal procedure, to charge to his customers any extra cost of carriage thereby incurred.

LEEK GAS-WORKS REPORT.

Mr. R. H. Ginman, the Engineer and Manager of the Leek Urban District Council Gas-Works, has submitted his third annual report.

He first gives a statement of the results for the years 1910 to 1917, in order to show the enormous task imposed on gas undertakings to meet the heavy increased costs in all directions. In the case of Leek, it is pointed out, rates and taxes have, since 1910, increased 336 p.ct., and coal 75 p.ct.; while gas is now sold at 2s. 6d. per 1000 c.ft. net, the same as it was in 1910. The sums given in aid of the rates also compare very well. The results per ton of coal carbonized show a marked improvement over anything previously attained, and compare favourably with the best gas-works management. As a matter of fact, in 1910 the quantity of gas accounted for per ton of coal used was 9239 c.ft., and in the past year 11,849c ft.; the decrease in the leakage in the same time being from 9·74 to 8·83 p.ct.

The total income from all sources for the past year amounted to £21,572, against £20,149; and the expenditure to £17,908, or an increase of £1802. Coal alone cost £1030 more, though 100 tons less was carbonized. Also, a new 40,000 c ft. per hour exhauster and steam-engine have been installed; and the old foundry has been converted into a coal-store. The gross profit of £3364 compares with £4043, being a decrease of £679. There is a net profit of £527, against £1217; but it has to be borne in mind that the cost of all improvements and extensions have been met out of revenue account. The total quantity of gas made was 127,886,000 c.ft., against 123 325,000 c.ft., or an increase of 4 561,000 c.ft., which was obtained with 100 tons less coal. The gas sold and accounted for was 1,322,000 c.ft. more than in the preceding year; the quantity unaccounted for having been 8·83 p.ct., as compared with 6·33 p.ct.—an increase which was brought about by the prolonged spell of intensely cold weather.

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CAPE TOWN AND DISTRICT GAS LIGHT COMPANY.

The Financial Position Further Improved.

The Twenty-Seventh Ordinary General Meeting of the Company was held last Wednesday, at the Offices, Egypt House, New Broad Street, E.C.—Mr. J. E. LILLEY, J.P. (the Chairman), presiding.

The SECRETARY (Mr. R. W. Blackburn) having read the notice convening the meeting,

The CHAIRMAN, in moving the adoption of the report and accounts, said it would be noticed that sales of gas during the year ended Dec. 31 last realized about £4000 more than in the previous twelve months. They had sold 8 million cubic feet more, which was practically the same amount as the increased make, the leakage having fortunately been reduced. The fact of this reduction in the unaccounted-for gas was really not surprising, because it was a matter to which very great attention had been paid. Residuals had brought in £600 less, entirely owing to the lower price which it had been necessary to accept for the coke. This, again, was not surprising, because the price of coal was now so much lower in Cape Town than it used to be, and this competed with their coke. However, they managed to keep the coke-yard fairly clear, which saved expense in handling. The price of tar had been somewhat better. Sales of fittings had brought in £868, as compared with £1799; but in the latter amount there were included two or three special contracts from which profit was derived which it could not be hoped would be repeated in future years. Therefore, they regarded the amount shown in the present accounts as being really a good result. On the debit side, it would be noticed that the cost of manufacture and distribution of gas was about £600 less than in the preceding year, in spite of the fact that there had been sent out 8 million cubic feet more gas. This was partly accounted for by the lower cost of coal; but a considerable saving had also been made by obtaining better results from the coal. There had only been used 8 tons more coal, though, as he had said, the gas manufactured had increased 8 million cubic feet. Wages had been considerably more; but nevertheless there was this saving of £600 in cost of manufacture and distribution. The figure for repair and maintenance was about the same as a year ago. It was an ample amount, and covered everything. The result of the debits and credits in the revenue account was to leave a balance of £25,556 to be carried to profit and loss; and in the latter account there was a total of £27,393 to be accounted for. The first item on the debit side of the profit and loss account was £216 less, for interest on first mortgage debentures. There had been written-off for depreciation £2320, against £1738 a year ago. The stock had been very carefully gone through; and when necessary, goods had been depreciated in value. A sum of £5000 had been transferred to the reserve and contingency account; and £3000 had been placed to reserve for plant, &c., renewals, which would be required as soon as it was possible to get the work carried out. The Directors thought it wise to get the money together gradually, so as to be ready for this contingency. As to the balance-sheet, nothing whatever had been added to capital account; everything having been paid for out of revenue. Stock, carefully valued, stood at £1300 less than a year ago. On the debit side, the first mortgage debenture debt had been reduced by £2500, in accordance with the new arrangement made. There were now no temporary loans in respect of the ordinary business. The reserve for plant renewals stood at £6000. The number of customers had been increased by 162 during the year; and the gain could have been much larger had it not been for the great difficulty experienced at the present time in sending out the necessary meters and fittings. The sales of coke had remained quite good; but they were accepting rather lower prices now than at the same time last year. As to coal, the Company had a very good contract running. Wages had not only increased very considerably, but were still going up. The Board continued to make reasonable allowances to the dependants of those men who had enlisted. They were a most loyal set of men; and it was only right that this should be done for them. The officers had continued to serve the Company in the same excellent manner that they had in past years. It was a source of gratification to the Directors to have been able to make some small reduction in the amount of overdue dividends on the preference shares. There seemed no doubt that it would be possible in the present year to do better in this respect than they had done last year. In fact, he thought the shareholders might look forward hopefully to the results of the current year.

The VICE-CHAIRMAN (Mr. H. R. Savory) having formally seconded the motion,

Mr. HAWKINGS referred to the unfortunate position of the ordinary shareholders, who had not had a dividend for a number of years.

Mr. MOODY suggested, as a means of giving the ordinary shareholders something, that an equitable scheme might be arrived at for funding the arrears of preference dividend, which would add to the value of the preference and ordinary shares in the market. Two or three of the largest shareholders might confer with the Board, to see whether it was possible to bring about such an arrangement.

The CHAIRMAN pointed out that the preference shareholders had a right to their full dividend before anything was declared on the ordinary shares. With respect to a funding scheme, the Directors had very carefully considered this matter; and they would be glad to feel that they could put forward a scheme which would prove acceptable to both parties. It seemed to him that the best way, in the long run, would be for the Company to rid themselves of the liability in the matter of back preference dividends.

Mr. CLAYTON agreed that any such scheme as had been hinted at would be premature now. When the arrears had been substantially reduced, things would be different.

The CHAIRMAN promised to take an opportunity of asking some of the shareholders to meet the Board and further consider the matter.

The retiring Director (Mr. Savory) and the Auditors (Messrs. Kemp, Sons, Sendell, & Co.) were re-elected; and the Chairman and Directors were thanked for their services.

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is the outcome of many months' research and practical experiment in the gas-fired disposal of domestic refuse, and each of its constructional details has an essential function in relation to the stove as a whole.

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Sample on view.

Pamphlet Gratis.

SOUTH AFRICAN LIGHTING ASSOCIATION, LIMITED.

Lower Consumption, Greater Profit—Advantage of Local Coal.

The Ordinary General Meeting of the Company was held last Wednesday, at the London Offices, No. 99, Cannon Street, E.C.—the Right Hon. Sir DANIEL F. GODDARD, M.P., in the chair.

The SECRETARY (Mr. William Cash, F.C.A.) read the notice of meeting; and the Directors' report was taken as read.

The CHAIRMAN, in proposing its adoption, said he should not have to weary the shareholders with many remarks upon the accounts, because they were on comparatively normal lines. There was nothing in them that called for serious complaint; and, on the whole, he thought they might be taken as quite gratifying. The report stated that though there was a reduced sale of gas, the profit arising therefrom was larger than in last year. The number of consumers kept fairly constant, as it had done for the last nine or ten years, notwithstanding the great co mpetition to which they were subjected by the electric light. What hesupposed they might call a nominal consumption per meter should be 13,000 c.ft.; but in 1916 it was 11,629 c.ft. The financial result was due first of all to the almost exclusive use of colonial coal. They carbonized a quantity of Colonial coal in the previous year; but during the whole of 1916 Colonial coal was used, except on one or two occasions when they were short of Colonial coal, and had to fall back on their little stock of English coal. This had substantially reduced the cost of their raw material. They had found a fairly suitable coal. It was not so good as English coal. It did not produce so much gas—in fact, they could not rely upon much more than 10,000 c.ft. per ton. The coke that came from it was good; but the quantity of tar produced was very small, This was rather a sad thing, because tar ruled at a very high price in South Africa. They had no difficulty in selling all the tar they made at top prices. Indeed, this low tar production was one of the disadvantages of using Colonial coal. Then the effect upon their coke sales of the Colonial coal coming upon the market was rather considerable, as it had brought down the price of coke. There was one other disadvantage he might mention, because those familiar with gas-works would realize it was rather a serious one. This local coal produced an unusual amount of naphthalene, which had a tendency to block-up the different parts of the works, and caused some little difficulty. But, on the whole, the balance of advantage was distinctly on the side of the use of this coal—in fact, he did not suppose for a moment they would have been able to obtain other coal this last year. They had done fairly well in sales of ammonia—in fact, they had had quite a record year in this commodity. There had been a much larger sale for their household ammonia, and also for the ·880 liquid ammonia. Of course, they would have preferred to have worked the ammonia up into sulphate of ammonia; but the difficulty was they could not get the sulphuric acid there. The high cost of carriage prohibited it being sent. He ought to say a word about the leakage. This was one of the items that had been favourable this year. The item of unaccounted-for gas had been largely reduced compared with the previous twelve months. As to the accounts, they were practically almost item for item identical. The reserve account and the coal reserve suspense account were both the same as in the previous year. There was one item which was in last year's balance-sheet, and which disappeared from this—that was income-tax. This was because the income-tax (which was £171 14s. in last year's account) was paid in South Africa, and this year this had been refunded to them under the new Act of Parliament. Therefore this item (which they formerly paid twice over) disappeared. It would be seen that the Directors recommended a slightly higher dividend, which they were well able to do; and, after paying this, they would still be carrying forward £5044. They proposed to make a reduction at Grahamstown on the 1st of July of 10d. per 1000 c.ft. This was the only way they could hope to increase the sale of gas there. The next paragraph in the report was an interesting one. It referred to the retirement of their late Manager, Mr. William Arnott, who served the Company for twenty-one years. There was no question about it, Mr. Arnott was an invaluable servant of the Company, especially in the early days when things were not going quite right, and they had to completely renew the works, which was done under the personal supervision of their friend Mr. Henry Woodall. He went out and put the works in order; while Mr. Arnott's energy in pushing the sale of gas in the town was very successful, and really brought about a very good time. But things had been going a little bit wrong lately. The competition from the electric light was very severe, and it had a little depressing effect, as one could imagine, on their Manager, who could not get the same results as formerly. The time had now come for him to retire. The Directors very highly appreciated the services Mr. Arnott had rendered to the Company during the past twenty-one years, and had made him a proper retiring allowance. He was now on his way back to England, if he had not already landed here. The Directors had found an excellent successor in Mr. Donaldson, who, two years ago, was sent over to Port Elizabeth as assistant to Mr. Arnott. He had proved himself an excellent man; and Mr. Arnott spoke in the highest terms of his ability, straightforwardness, and of his good work. The Directors felt that, in leaving the works and business in Mr. Donaldson's hands, they were not running any risks.

Mr. A. L. DON seconded the motion, which was unanimously carried.

A dividend was then declared at the rate of 9 p.ct. for the year (subject to income-tax of 4s. 6d. in the pound), less the interim dividend already paid.

Moved by the CHAIRMAN, and seconded by Mr. G. CRISPE WHITELEY, Mr. Henry Woodall was re-elected a Director; and proposed by Mr. WILLIAM RICHARDS, and seconded by Mr. A. J. KINGDON, Mr. P. D. Griffiths, F.C.A., was reappointed Auditor.

Cordial recognition was made of the services of the Chairman and Directors, and of the officers in South Africa and at home.

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THE DILUTION OF LABOUR.

In common with all other industries, the gas industry has carried out dilution of labour by the introduction of women into occupations hitherto considered the exclusive domain of men. The extent of the dilution, however, has not been so large as that which has taken place in the engineering industries; and it was with the engineering industry —*i.e.*, munitions—that the discussion at the Technical Circle of the Institute of Journalists last Thursday week was mostly concerned.

The general principles, however, apply throughout; but before indicating one or two of the main points of the discussion, it may be mentioned that a letter was received from Mr. Charles Carpenter, D.Sc., of the South Metropolitan Gas Company, in which he stated: "We have gone, I think I may say, at least as far as any gas undertaking in the employment of women in the industry. The surprising thing to me is the manner in which they have adapted themselves to the requirements, or perhaps it would be more correct to say how we have been able to select suitable women in various directions with which the public is familiar. But we find that they can be trusted with a very large proportion of retort-house labour, which we invariably in the past associated with the sterner sex."

This was the only direct reference to the gas industry throughout the discussion, which was opened by Mr. G. H. Baillie, Chief Technical Adjudicator, D.A. Section, Ministry of Munitions, and was taken part in by a number of ladies and gentlemen directly concerned with the problem of women labour from many points of view. The impression conveyed by the discussion is that the problem seems to divide itself into three points of view. There is, first of all, the department of the Ministry of Munitions whose task it is to secure more and more women to replace men to be taken into the Army, and whose function presumably will cease when the war demand for this class of labour no longer exists; in the second place, there is the employer who in many cases was reluctant at first to embark upon women labour, but who, through the wiles of the young and enthusiastic male and female staff of the Ministry, has been educated up to the employment of women and who are now confessedly so pleased with the result that it is not looked upon merely as a war-time expedient; and, finally, there are those less commercially minded people (prominent among whom is Miss Anderson, the Chief Lady Inspector of Factories under the Home Office), who take a more human interest in the future, and regard with some misgivings a perpetuation of the employment of women in the form in which it is now being developed. Miss Anderson, and many with her, wishes to see woman return to her natural sphere in life. This latter, perhaps, is a little outside our scope, except that it constitutes an important element in the whole problem of the after-war use of women in industry, in which, as Mr. Carpenter's letter shows, the gas industry will be involved.

For the most part, however, the discussion was confined to the facts relating to the dilution of labour as they have been found since the Ministry of Munitions took the problem in hand. Much has been heard of the prejudice of trade unions and so on; but speaker after speaker at present closely associated in this work were emphatic that the greatest obstacle to the employment of women from the commencement has been the prejudice of the employers. A good deal of play has at times been made with the fact that women have learned, in a very short space of time, to do work which in the past boys have taken years to pick up. But irresponsible writers on the subject either overlook, or are not aware of, one or two important facts. The women are taught to do the work; and it cannot be denied that the average apprentice was left to acquire his knowledge as best he could. To such an extent has shop organization now reached, that there are complete gangs of women at work under forewomen—trouble generally following the handling of women by a foreman. Instances were given in the discussion of the dangerous work carried out by women in chemical factories, and of their coolness in critical circumstances, all of which was well testified to in the recent exhibition at the Royal Colonial Institute.

Put into a small compass, the discussion resolved itself into an eulogy of women, and an appeal to the Technical Press to assist in the education of the employer and to urge all who have not yet attempted to instal women in occupations hitherto regarded as unsuitable for them, to apply to the Ministry of Munitions, who will send down an organizer to demonstrate how it can be done. For the present needs of the country, it is essential this fact be driven home. The after-war problem will no doubt receive treatment in due course.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *June* 4.

Business in tar products continues quiet. The pitch shipping season is practically over, and the latest business done was reported at 37s. 6d. to 38s. per ton, net in bulk at sellers' works. Solvent naphtha is a little firmer, and business is reported at 2s. 2d. net and naked at sellers' works. Creosote is in good demand, and 4¼d. to 4½d. per gallon is obtainable.

There continues a fair demand for sulphate of ammonia for agricultural purposes, at the fixed prices.

Tar Products in the Provinces.

June 4.

There is nothing new to report concerning the market for tar products.

The average values for gas-works products during the week were

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MANCHESTER.

Gas-works coal tar, 20s. 6d. to 24s. 6d. Pitch, East Coast, 16s. 6d. to 17s. 6d. per ton; West Coast—Manchester 15s. 6d. to 16s., Liverpool 16s. 6d. to 17s., Clyde 17s. to 18s. Benzol, 90 p.ct., North, 10¼d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6¼d. to 6½d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 9d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3¼d. to 3⅜d. Heavy oils, in bulk, North, 3⅜d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *June 2.*

There is nothing new in the situation, export licences not yet being again obtainable. The price fixed for home agricultural purposes remains at £16 per ton direct to farmers, and £15 10s. to mixers and distributors, net cash, in makers' bags, carriage paid to buyers' stations in the United Kingdom.

Nitrate of Soda.

This market continues strong, and holders on spot require 26s. per cwt. for ordinary quality and 26s. 6d. for refined.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is generally steady; but there are some collieries working short time because of the lack of ready steamers. In the steam coal trade, best Northumbrians are in fair inquiry at 30s. per ton f.o b.; second-class steams are from 22s. to 26s.; and for steam smalls, with an abundant supply, the quotation is from about 16s. 6d. to 19s. Much of the business that is being done, however, is for the Allies at "schedule" prices. In the gas coal trade, demand is steady, stocks needing refilling, and the output is good under the current conditions of the trade. Best Durham gas coals are from 25s. to 26s. per ton f.o.b.; for second-class gas coal, the current price is from about 16s. 6d. to 19s. 6d.; and for "Wear specials," about 28s. 6d. to 29s. 6d. is the general quotation. Local consumption is now moderate; but tolerably full quantities are being delivered on long contracts, and shipments seem to be freer than they have been. There is little reliable news as to the new contracts that are believed to be in course of settlement; but prices are on the whole steady in such cases. The freights on gas coals are near 20s. per ton Tyne to London; while to the neutral ports they are relatively higher. Good gas coke is steady, and the quotation varies from 31s. 6d. to 32s. 6d. per ton f.o.b., according to the place of shipment. Coke freights are still based on 45s. Tyne to the North of France ports.

Lurgan Gas Undertaking.—The Lurgan Town Council, by a majority, have adopted the Gas Committee's recommendation that the gas-works employees be granted a war bonus of 2s. per week. The minority were anxious that a larger bonus should be given. Another recommendation which was adopted was for the charging of 4s. per 1000 c.ft. to firms employing gas-engines for motive power, and 4s. 6d. to those using it intermittently or as a stand-by.

Decreased Consumption at Bideford.—Mr. F. A. Searle, presiding at the annual meeting of the Bideford Gas Company, said that, though wages had been increased all round, the actual expenditure under this head last year was £70 less than in 1915, owing to the depletion of the staff. The revenue from private consumers increased £298; but for public lighting they had only £413, against £607. There was a larger revenue from coke; but the quantity sold was less. Owing to the lighting restrictions and the Daylight Saving Act, the sale of gas fell from 57,653,000 c.ft. in 1915 to 51,924,000 c.ft. There was an increase from 10,600 to 10,955 c.ft. in the rate per ton of coal. From March 31 the price of gas was increased from 3s. 4d. to 3s. 10d. per 1000 c.ft., which was the Company's standard price, and carried a dividend of 10 p.ct. One of the shareholders moved that the Directors' fees should be reduced; but the motion found little support.

Spenborough New Gas-Works.—The Spenborough District Council have resolved, with only three dissentients, to make a grant of £200 to Mr. A. L. Jennings (the Gas Engineer), for special services in connection with the construction of the new gas-works, which cost over £40,000. The original proposition in committee had been a grant of £250; but there was some opposition, entirely on the point of the amount of the grant—all speakers recognizing that Mr. Jennings, on a works which had had no architect, and carrying on his ordinary duties at the same time, had given services quite over and above what might be ordinarily expected of a gas manager. The three dissentients to the resolution favoured a grant of £150. It was afterwards announced by Mr. Taylor (the Chairman of the Finance Committee) that the net profit of the gas-works during the past year, including the sum of £600 decreased assessment, and special sale of certain material, was £4000.

Free Gas for a Service Club.—It was stated in the minutes of the Belfast Gas Committee, submitted at the Corporation meeting last week, that the Chairman had refused to accept a motion to supply free gas to the local Sailors' and Soldiers' Club, as the Town Solicitor had advised that they could not legally do so. Mr. Leatham now said that, while he did not yield in patriotism to any member of the Council, he held they had no right to give away what was not their own. Mr. H. Johnston, in moving that gas be supplied free, pointed out that a free supply of electricity was being given. Mr. Alexander said that, if an indemnity were given, the Local Government Board would not surcharge, having regard to the fact that the men who frequented the club had been wounded in the country's service. Alderman Craig said they had refused fourteen applications for free gas—one from a place which last year used £498 worth.

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Shipley Gas-Works Accounts.

The Shipley Urban District Council have decided to advance the price of gas from 3s. 9d. to 4s. 2d. per 1000 c ft. It had been hoped that the price need not be advanced further; but the accounts for the past year showed the increase to be essential. Coal cost £4690 more than in the previous year. The income from sales of gas decreased by £1560; while the cost of wages and material, rates and taxes, and loan charges increased £8744, from which had to be deducted £566 extra return from coke and residuals, leaving a net loss of £8178. The street lighting consumption was only 1 million cubic feet, as against 4 millions in the previous year, and 13 millions normally. The decrease in the income, it was explained by the Chairman (Mr. T. Hill), was largely due to the Summer Time Act and the great cost of coal. The worst feature in the accounts was the falling off of consumption by the firm of Sir Titus Salt, Bart., Sons, & Co., Ltd., at Saltaire. When the Council purchased the Saltaire gas rights, the consumption there was 11 million cubic feet; but in 1913 it had decreased to 7 millions, and now was less than 2 millions. The standing charges had remained the same. Coal had advanced about 50 p.ct since the war began; but the total increased charge for gas was only 33·3 p.ct. Mr. F. F. Rhodes, in seconding the advance, said the rise was only 5d., whereas the cost of production had increased about 10d. per 1000 c.ft. Interest and sinking fund charges would remain the same until 1941; and not until then, he thought, could the price of gas at Shipley be much less than 4s. The resolution was carried; the new price being subject to 2d. discount for prompt payment. The Council, having in mind the poorer classes, transferred £1500 to the Gas Committee from the general rate, in order to avoid a still further rise in the price of gas.

Australia and Daylight Saving.—A Reuter message from Melbourne states that the Federal Cabinet have decided to repeal the Daylight Saving Act.

South Suburban Employees and Exemption.—Before the Lewisham Tribunal last Wedesday, there were twelve cases in which the South Suburban Gas Company applied for further exemption for members of their staff—clerks, gas-fitters, and district inspectors. The Clerk reported that he had received a letter from Mr. Wilfrid Wastell (the Secretary of the Company), to the effect that the Munitions Area Recruiting Officer had issued certificates that these men were in protected occupations, to which he had replied that the cases were thereby removed from the jurisdiction of the Tribunal. The Military Representative (Mr. H. E. Harry) said he wished to make a public protest against the granting of such certificates to clerks, some of them single men, and all Class A, aged 27, 29, 30, 31, and 32. The Chairman: I think the proper course would be for you to make a protest to your superiors, so that they might make representations to the person who has given these certificates. Mr. Cockerton observed that it was very difficult to understand what was behind these regulations. The Chairman: I must confess I have tried to understand, but cannot at all.

Price of Gas in Glasgow.—It is understood that there will be an increase in the price of gas in Glasgow. This is not due to alteration in the cost of coal, which remains much the same as last year, but to the enhanced value of other materials used in the manufacture of gas, and also to higher wages. The increase will be 2d. or 3d. per 1000 c.ft. on the rate for lighting and domestic purposes, which is at present 2s. 6d. within the city area.

Management of the Biddulph Gas-Works.—In the course of the proceedings at the last monthly meeting of the Biddulph Urban District Council, the Clerk reported, according to a local paper, "that the late Gas Manager (Mr. G. Hood) had refunded the sum of £41 12s. 9d. found to be deficient in the gas accounts. The Gas Committee at a special meeting had resolved that the Manager be discharged from their employ immediately."

Rise in Price at Drighlington.—The Drighlington and Gildersome Gas Company have decided that, owing to the abnormal conditions as regards the increase in cost of materials and labour, they must advance the price of gas 6d. per 1000 c.ft., as from July 1, subject to a revised scale of discounts, ranging from 5 p.ct. upwards, according to consumption. There is no increase in the price of gas supplied through separate meters for gas-engines; but the revised scale of discounts applies to this consumption.

Smaller Consumption at Todmorden.—Mr. W. Greenwood informed the Todmorden Town Council last week that the consumption of gas during the past year had considerably decreased; restricted lighting accounting for 6¼ million c.ft., and the remainder of the falling off being due to daylight saving. The coal carbonized had been 1480 tons less than during the previous year; and the make of gas was 15¾ million feet less. The total income was £30,590, and the expenditure £23,458, leaving a gross profit of £7132. The net profit was £744, as against last year's £1596. Mr. Greenwood thought every credit was due to the Manager (Mr. F. V. Barnes) and the staff for such a good result in view of the circumstances. Despite all increased costs, the price of gas had only been advanced 6d. since the war began, or 5½d. taking the discount into consideration.

Chelmsford Gas-Works Transfer Costs.—The Town Clerk of Chelmsford has submitted the accounts received from counsel and experts retained on behalf of the Corporation in connection with the transfer of the gas undertaking. The total is £706; and the charges agreed to are in the Town Clerk's opinion reasonable, having regard to the work done and the difficulties entailed in connection with the transfer. The Gas Company's bill of costs for counsel, solicitors, and experts amounts to £1138; and the Town Clerk has inquired whether the Company are prepared to accept £1050 in settlement, if the Corporation agree not to have the costs taxed. The Committee have adjourned consideration of the matter until the reply of the Company is received. It will be remembered that the parties agreed upon the price to be paid for the undertaking without actually proceeding to arbitration.

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MANCHESTER. NOTTINGHAM.

Food Economy Campaign in Guildford.—The Gas Company are actively associating themselves with the national scheme of food economy in Guildford. They are providing the gas-cookers for the Food Economy Exhibition which opened last Wednesday, and a lady lecturer to use them; and incidentally their Engineer and Manager (Mr. P. C. Cleasby) is acting as Chairman of the Committee of Management of the exhibition. We hope later to deal more fully with the exhibition, which bids fair to be very useful in furthering the objects in view. It is anticipated that Captain Bathurst will attend the exhibition next Friday.

New Lighting Restrictions.—With a view to checking the consumption of gas and electricity for certain forms of unnecessary lighting, the Home Secretary, after consultation with the Coal Controller, has made an Order, dated May 22, entitled the "Advertisement Lights Order, No. 478," prohibiting altogether the use of sky signs and other illuminated advertisements and lights outside or at entrances to shops or theatres, cinemas, and other places of amusement, except such as may have been approved by the police as necessary for the safety of the public. The prohibition applies at all hours before or after dark. The Order also prohibits the retention of the interior lighting of shop windows after the shops are closed for the serving of customers.

Loss on the Working at Devonport.—The Plymouth Corporation Gas Committee met on Thursday last, when the Borough Treasurer (Mr. H. J. Hoare) submitted the accounts of the Devonport gas undertaking for the year ended March 31. The total receipts amounted to £101,810; and after deducting the expenditure, there was a gross surplus of £17,489. After payment of dividends, interest, redemption of stock and loans, and income-tax, there was a net loss of £3062. The Committee decided to increase the price of gas to ordinary consumers from 2s. 11d. to 3s. 2d. per 1000 c.ft. from the meter readings for the quarter ending June 30.

Coleraine Gas Prices.—The Coleraine Urban Council, on the motion of the Chairman (Mr. W. W. Hill), confirmed a resolution increasing the price of gas to 4s. 7d. per 1000 c.ft. for power purposes, and to 5s. for all other purposes measured through ordinary meters. Mr. Hill said that at the beginning of the war the Gas Committee had a credit balance of £1300. They did not anticipate that the struggle would have lasted so long, and had not, therefore, made any appreciable increase in the price; but the position now was that the £1300 reserve had been reduced to £500. In addition to giving cheaper gas, they sold coke to the poorer people at a much cheaper rate than neighbouring towns. Now they had to advance the price of gas and coke to figures more commensurate with the cost of production.

STOCK MARKET REPORT.

THE Stock Exchange has had a short business week—opening on Tuesday and closing on Friday; and even this abbreviated space was watered down by an undesirable degree of inactivity. But, quiet as things were, the general tone was decidedly satisfactory and in some lines quite cheerful. There was not any one particularly exhilarating factor to stimulate this feeling, but a sort of general sense of contentment. In war news, despatches from the Western front—both British and French—in calm and unsensational terms, afforded evidence of gains consolidated, and doubtless foreshadowed preparations for further progress. German submarine depredations showed lessening figures, and other matters helped to brighten the outlook. Thus, with the exception of one or two lines labouring under especial disadvantages, prices were buoyant.

The gilt-edged market was again conspicuous for its firmness. Stock was scarce, as sellers were unwilling to part when £40,000,000 of War Loan dividend was let loose demanding reinvestment. Government issues of all kinds were firm as a rock, and even Home Rails (especially the prior charges) participated in a degree. Americans were quiet and mostly unchanged, and Canadians were steady; the disposition being to regard the position without any apprehension. Argentines were only so-so, traffics being unsatisfactory. In the Foreign market, Russians opened firm and made a slight advance; but next day a reaction set in, as internal dissensions seemed to be spreading, and Russian interests in general drooped and closed dull. On the other hand, Brazilian, Chilian, Japanese, and Chinese were firm. Among the Miscellaneous group were many bright points. Ammunitions and Iron and Steel were in good demand, Textiles and Rubber were firm, and much attention to shipping was attracted by the announcement of a coming fusion of the P. and O. and the Union of New Zealand Companies.

Business in the Gas Market was of the quietest description, and devoid of all salient feature. So far as the prices marked for bargains concluded are an indication, the tone was solidly steady without being actually buoyant—only fractionally better than the week before would be about the mark. Few changes were made in quotations, and most of these were only *ex div.* variations.

In the Money Market, there was at first a good demand, but it subsided.

Bargains done for cash during the week were as follows: On Tuesday, Bombay 5⅛, Gas Light ordinary 72⅜, 73¼, 72⅜, 72½, ditto preference 73¼, Imperial Continental 79⅜, 80, Primitiva preference 60s., South Metropolitan 78¼, Tottenham "B" 69½, 70. On Wednesday, Commercial 3½ p.ct. 68, Croydon debenture 67½, 68, Gas Light ordinary 73¼, 73⅜, Imperial Continental 80¼, South Metropolitan 77½, Tottenham 70. On Thursday, Bombay 4¾, Gas Light ordinary 72⅜, 73, 73¼, 73⅛, ditto 10 p.ct. bonds 170¼, 170½, Imperial Continental 80, 80¼, Newcastle 69½, 69¾, Primitiva preference 60s., South Metropolitan 78½.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When Dividend.	Previous Div or Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,473	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	58—63	..
1,551,868	,,	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	50—55	..
874,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	58—63	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅛	4⅞—5⅛*	4⅞—5⅛
50,000	10	Feb. 26	16	15/-		29—30	24—26	..
883,110	10		7	7/-	Bournemouth Gas and Water: 10 p.c.	15—15½	10⅞—11½	..
115,000	10	,,	6	6/-	B 7 p.c.	13½—14	9½—92	..
159,740	—	—	—	4%	Pref. 6 p.c.	..	71—73	..
992,045	Stk.	Feb. 26	14	55/-	4 p.c. Deb.	261—266	81—84	..
734,920	,,	,,	11	53/9	Brentford A Consolid.	204—209	79—82	..
55,000	,,	,,	5	5%	Do. B New	109—111	83—88	..
221,400	,,	June 11	4	4%	Do. 5 p.c. Pref.	91—93	67—69	..
217,880	,,	Feb. 26	11	10%	Do. 4 p.c. Deb.	208—213	150—155	..
244,200	,,	,,	8	7%	Brighton & Hove Orig.	154—159	102—107	..
530,000	20	Mar. 26	12½	22/6	Do. A Ord. Stk.	44—45	33—34	..
120,000	Stk.	June 26	4	4%	British	88—90	66—68	..
245,771	,,	,,	4	4%	Do. 4 p.c. Deb. Stk.	85—87	55—58	..
100,000	10	—	—	—	Buenos Aires 4 p.c. Deb.	1½—2½	1⅝—2½	..
100,000	10	—	—	4½%	Cape Town & Dis., Ltd.	4—6	5½—6	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Pref.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Do. 4½ p.c. Deb. Stk.	108—110	79½—80½	..
1,518,280	,,	Feb. 12	5/9/4	49/4	Chester 5 p.c. Ord.	106—108	72—74	..
560 000	,,	,,	5½	46/8	Commercial 4 p.c. Stk.	103—105	66—68	67—68
475,000	,,	June 11	3	3%	Do. 3½ p.c. do.	69½—71½	52—54	..
800,000	,,	,,	4	—	Do. 3 p.c. Deb. Stk.	76—79	39—41	..
200,000	,,	,,	7	—	Continental Union Ltd.	115—118	60—62	..
278,400	—	—	—	11½%	Do. 7 p.c. Pref.	..	170—180	..
—	—	—	—	10%	Croydon B and C 7 p.c..	..	..	..
492,270	Stk.	—	6	5⅜%	Do. E	123—125	95—100	..
55,000	,,	—	4	4%	Derby Con. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	7/6	Do. Deb. Stk.	17½—18	12—13	..
16,313,430	Stk.	Feb. 10	4/17/4	42/-	European, Ltd.	98—102	72—74	72½—73½
2,600,000	,,	,,	3½	3½%	Gas: 4 p.c. Ord.	76—79	56—58	..
4,062,235	,,	,,	4	4%	Light: 3½ p.c. max.	96—99	72—74	73½—73½
4,674,850	,,	June 11	3	3%	and: 4 p.c. Con. Pref.	72½—74½	56—58	..
130,000	,,	,,	10	10%	Coke: 3 p.c. Con. Deb.	..	..	170½—170½
258,740	,,	Mar. 12	5	4⅜%	10 p.c. Bonds	87—89	50—55	..
70,000	10	April 29	11	6%	Hastings & St. L. 3½ p.c.	16½—16½	7½—8½*	..
26,600	—	—	—	9⅜%	Hongkong & China, Ltd.	..	120—130	..
131,000	Stk.	Mar. 12	7½	7⅜%	Hornsey 7 p.c..	151—154	102—107	..
65,780	,,	,,	6⅜	5⅜%	Ilford A and C.	115—118	80—85	..
65,500	,,	June 26	4	4%	Do. B	92—94	68—71	..
4,940,000	,,	May 14	9	4½%	Do. 4 p.c. Deb.	150—160	79—84	79½—80½
1,235,000	,,	Feb. 12	3½	3⅜%	Imperial Continental	84—86	62—65	..
235,242	,,	Mar. 12	6½	6⅜%	Do. 3½ p.c. Deb. Red.	119—121	85—90	..
2,498,905	,,	Feb. 26	10	5%	Lea Bridge Ord. 5 p.c.	211—213	82—84	..
806,088	,,	June 26	4	4%	Liverpool 5 p.c. Ord. A	146—148	72—74	..
75,000	5	June 11	6	2/-	B	..	72—74	..
250,000	100	April 1	4½	4½%	Malta & Mediterranean	4½—4⅝	3¾—4½	..
541,920	20	May 28	4	6/-	Met. of Melbourne 4½ p.c. Deb.	99—101	88—98	..
1,875,892	Stk.	July 29	4½	4⅜%	Monte Video, Ltd.	11½—12	8—8½*	..
529,705	,,	June 26	3½	3½%	Newcastle&Gatsh'dCon.	98½—99½	69½—70½	69½—70
55,940	10	Feb. 26	7/14/0	7/-	Do. 3½ p.c. Deb.	82—83	73—75	..
300,000	Stk.	May 14	8	8%	North Middlesex 7 p.c.	14—15	10—11	..
60,000	5	Mar. 26	10	1/-	Oriental, Ltd.	117—122	104—106	..
60,000	50	Feb. 26	13	12%	Ottoman, Ltd.	7½—7⅞	2—3	..
100,000	50	,,	12	11%	Portsea, Island B	125—131	92—97	..
52,000	50	,,	10	9%	Do. C	118—121	85—90	..
249,980	5	April 29	8	—	Do. D	..	..	..
499,960	5	June 26	5	2/6	Primitiva Ord.	5½—6	2—2½	60/-
521,600	100	June 2	4	4%	Do. 5 p.c. Pref.	4½—5	3—3½	..
—	—	—	—	4%	Do. 4 p.c. Deb.	91—93	78—80*	..
346,198	Stk.	June 26	4	4%	Do. ,, ,, 1911	..	..	..
150,000	10	May 14	6	6/-	River Plate 4 p.c. Deb.	85—87	61—67	..
125,000	50	July 1	5	5%	San Paulo: 6 p.c. Pref.	10½—11	7⅞—8½	..
135,000	Stk.	Mar. 12	10	10%	5 p.c. Deb.	47—49	42—44	..
209,984	,,	,,	10	10%	Sheffield A	223—224	175—180	..
523,500	,,	,,	10	10%	Do. B	222—224	175—180	..
90,000	10	May 28	9	6/-	Do. C	220—222	175—180	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South African	10½—11½	..	..
1,895,445	,,	July 10	3	3%	South Met. 4 p.c. Ord.	111—113	77—79	77½—78½
224,820	,,	Feb. 26	8½	8%	Do. 3 p.c. Deb.	72½—74½	56—58	..
952,795	,,	,,	6	48/4	South Shields Con. Stk.	157—159	140—142	..
60,000	,,	,,	5	5%	S'th Suburb'n Ord. 5 p.c.	114—116	76—78	77½
135,000	—	—	—	48/4	Do. 5 p.c. Pref.	110—112	77—79	..
187,558	Stk.	June 26	5	5%	Do. West Kent	..	..	..
647,740	,,	May 14	5	5%	Do. 5 p.c. Deb. Stk.	116—118	88—90	..
120,000	,,	Feb. 12	7½	7½%	Southampton Ord.	99—102	76—78	76—76½
782,275	,,	,,	6	5⅝%	Tottenham: A 5 p.c.	135—138	95—100	..
181,255	,,	June 26	4	4%	B 3½ p.c.	115—117	68—73	69½—70
182,380	10	Dec. 30	5	—	District: 4 p.c. Deb.	87—89	65—67	..
149,900	10	July 1	5	5%	Tuscan, Ltd.	5—6	1—2	..
236,476	Stk.	Mar. 12	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
					Tynemouth 5 p.c. max..	108½—109½	89—91	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 26	8⅔	80/-	Wandsworth A 5 p.c..	151—156	114—119	..
255,636	,,	,,	6⅔	65/-	Do. B 3½ p.c.	129—134	99—101	..
108,075	,,	,,	5/17/3	56/-	Do. C 3½ p.c.	110—115	86—91	..
352,000	,,	,,	6⅔	58/9	Wimbledon 5 p.c.	117—122	88—93	..
98,000	,,	,,	6⅔	65/-	Epsom 5 p.c.	121—126	96—101	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66—69	51—54	..

* Ex. Div.

Food Economy Instruction at Hastings.—Instruction on food economy imparted at the show-rooms of the Hastings and St. Leonards Gas Company proved so popular that the public had to be admitted in batches. A local paper, commenting upon the matter, says that during the twenty minutes' practical demonstrations, the windows were thronged with those who were fortunate enough to get front places, which afforded them an opportunity of witnessing the manipulation of the substitutes. That there was an enormous interest taken in the exhibitions is proved beyond doubt.

At their next meeting, the Salford Corporation will be asked by the Gas Committee to increase the price of gas 4d. per 1000 c.ft.

Messrs. John Yates & Co., Ltd., of Aston Manor, Birmingham, have received from the Road Board, in connection with military roads, orders for three of their improved 1917 tar sprayers.

Mrs. Mary Jane Cowan, aged 58, was found lying dead on a sofa in her house in Foyle Street, Belfast; the gas being fully turned on. It is not known whether the affair was acoidental; but it is presumed to have been so.

Under the auspices of the Alliance and Dublin Consumers' Gas Company, a series of lectures has been arranged at the Hawkins Street premises, Dublin, on gas-heated boilers and their application to domestic hot-water apparatus, and for heating buildings, &c.; the lecturer being Mr. T. T. Smith, of Messrs. John Wright & Co., of Birmingham. Mr. John Murphy, the Chairman of the Gas Company, presided at the opening lecture, when the audience was highly representative of the business community of the city and district, as well as of the general public, and keen interest was manifested in the exhibits and the arrangements made for the demonstrations. These latter were carried out by Mr. H. F. Cotton, the Distributing Engineer, and the officials of his department; Mr. F. H. Ferguson, Messrs. Wright's Irish representative, assisting.

The Brighouse Corporation Gas Committee have advanced the salary of their Gas Engineer (Mr. H. Davies) from £400 to £450 per annum.

The Smethwick power station of the Shropshire, Staffordshire, and Worcestershire Power Company was the scene last Saturday week of a fire which resulted in the temporary shutting-down of the plant. The trouble was due to a short-circuit.

The Roscrea (co. Tipperary) District Council have asked the sanction of the Local Government Board for the introduction of a public lighting scheme—preferably a gas system, though oil is being advocated by some of the ratepayers, on financial grounds.

Messrs. Fletcher, Russell, & Co., Ltd., of Warrington, are issuing a new booklet descriptive of their well-known makes of gas-cookers, grillers, boilers, irons, &c., as well as separate pamphlets dealing with individual types of apparatus. Among the latter, a new gas-heated household incinerator is described, the "Celerity" instantaneous water-heater for lavatory use, and the "Reliance" circulating boiler.

Scottish owners of motor-cars are, says a correspondent, directing their attention to the use of coal gas as a substitute for petrol. It is considered that 1000 c.ft. of gas are equal to 3 gallons of petrol; and users of gas for power purposes who buy for about 2s. per 1000 c.ft. secure a saving on the fuel bill compared with petrol of between 3d. and 4d. per mile. A lorry constantly at work might save £250 a year. It is said there is no trouble in the actual use of the gas for cars.

The Gas Light and Coke Company's "Co-Partners' Magazine" announces that another loss has been sustained by the Company at sea, through the torpedoing of the s.s. *Firelight*. Happily, both officers and crew were saved. The vessel, which was launched in 1896, was purchased by the Company only last August, though she had before that made many voyages with coal for the Company. Various additions are being made to the Company's fleet; and a photograph of one of these vessels—the s.s. *Glow*—appears in the "Magazine."

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ASSISTANT ENGINEER. No. 6312.
RESEARCH CHEMIST. Leeds University. Applications by June 22.
STOKER. Tiverton Gas-Works..
SULPHATE MAKER AND YARDMAN. Tiverton Gas-Works.

Appointment, &c., Wanted.

GAS-FITTER. No. 6313.

Plant, &c. (Second Hand) for Sale.

GASHOLDER. Mackrill and Sons, Aylesbury.
PURIFIERS, SCRUBBERS, CONDENSERS, MOUTHPIECES, ASCENSION AND BRIDGE PIPES, HYDRAULIC MAINS, &c. Longwood Gas Offices.

Mortgage Debentures Sale.

SUTTON GAS COMPANY. Tenders by June 22.

TENDERS FOR

Coal.

EAST DEREHAM URBAN DISTRICT COUNCIL. Tenders by June 19.
HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD. Tenders by June 12.
STRETFORD GAS COMPANY. Tenders by June 12.

Tar and Liquor.

ACCRINGTON GAS AND WATER BOARD. Tenders by June 12.
LOUGHBOROUGH GAS DEPARTMENT. Tenders by June 11.
READING GAS COMPANY. Tenders June by 18.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

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See Illustrated Advertisement, May 15, p. 268.

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